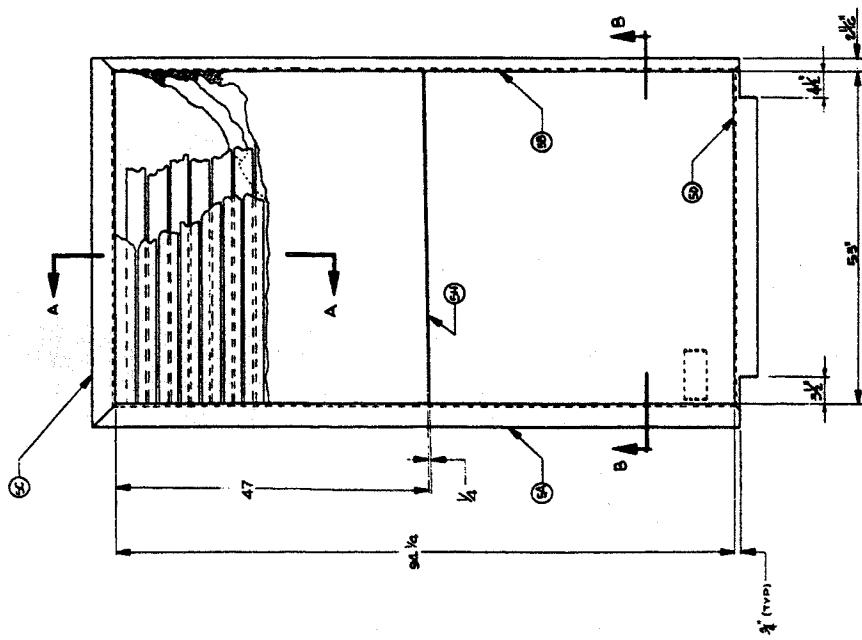
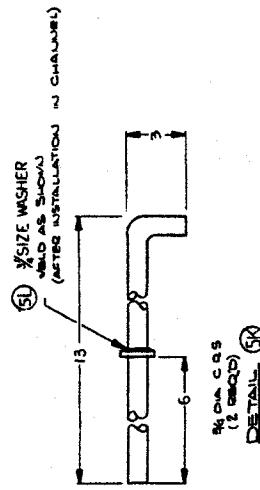
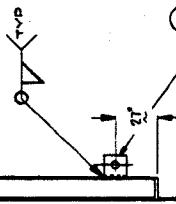
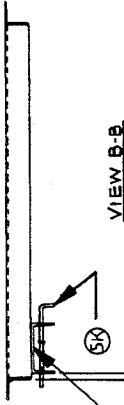
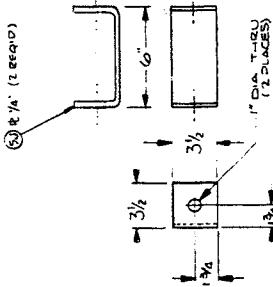


Note

1. THIS DOOR PANEL IS IDENTICAL TO SIDE PANEL, SHEET 4, EXCEPT
IT IS SHOWN AS NOTED.
2. SEE DRAWING 18700 FOR ALTERNATE SLIDING DOOR DETAILS.



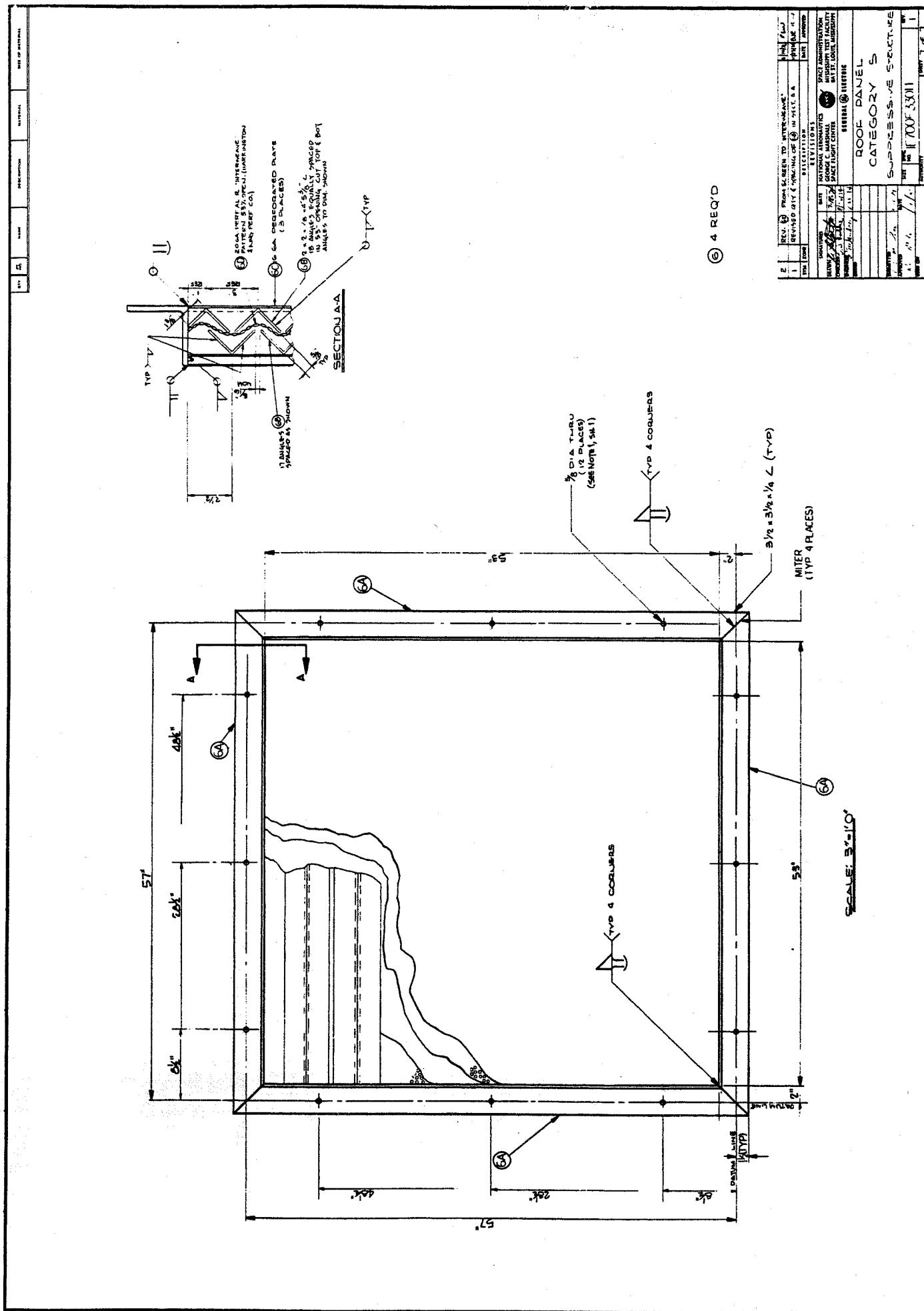


Figure A-11g. Group 5 Shield Construction Details (continued)

REV.	1	DATE APPROVED	
SYN. ZONE		DESCRIPTION	
REVISIONS		REVISIONS	
SIGNATURES		SPACE ADMINISTRATION	
DRAWING NO.	7-23-74	GEORGE C. MARSHALL	MISSISSIPPI TEST FACILITY
CHECKED	7-23-74	SPACE FLIGHT CENTER	BAT ST. LOUIS, MISSOURI
ENGINEER	R. Schubert	GENERAL ELECTRIC	
ISSUED	7-24-74		
SUBMITTED		HINGE, 1000# CAPACITY	
APPROVED		CATEGORY 5	
DATE		SUPPRESSIVE STRUCTURE	
SIZE	1 1/2"	REV.	
DWG. NO.	IE400C33009	A	
C. NO.	7-23-74		
USED ON	IE100 OF 3301		

PIN MAY BE PART
OF JAMB LEAF

MATERIAL : COLD ROLLED STEEL
VENDOR : G & G MFG CO. INC., CONN.
OR EQUAL

Figure A-11h. Group 5 Shield Construction Details (continued)

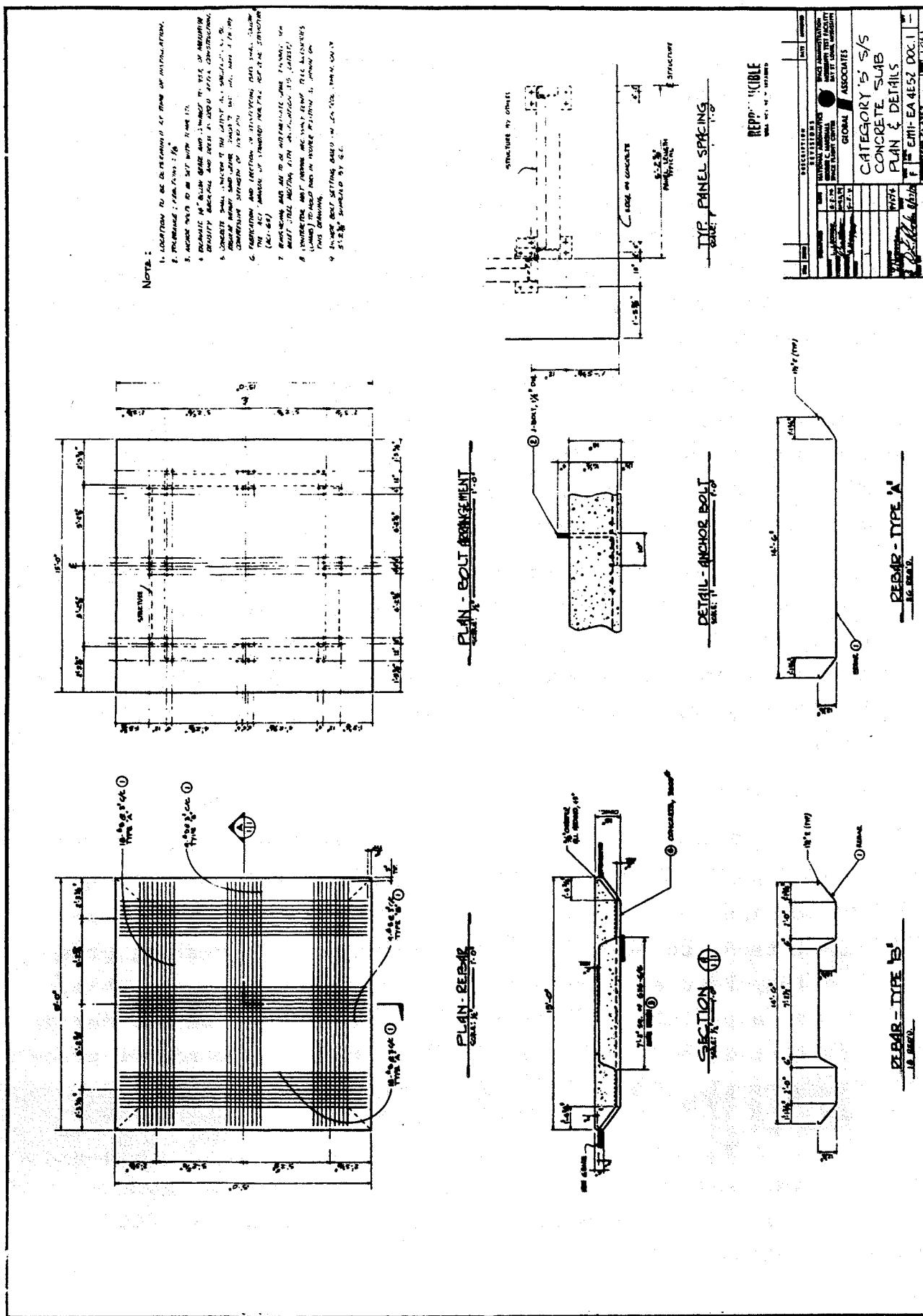


Figure A-11i. Group 5 Shield Construction Details (concluded)

two on the outer, with the outer two spaced slightly apart. Between the perforated plates are two rows of structural angles. The two layers of angles are reversed and staggered so that the gap left between individual angles in a layer is covered by angles in the other layer. A sheet of 20 gauge perforated aluminum plate interweave pattern is placed between the layers of angles. The complete assembly is surrounded by 3-1/2 x 3-1/2 x 1/4 inch structural angle which is attached to the S8 x 23 wall or roof members.

The foundation for the Group 5 shield consists of a reinforced concrete slab on grade as shown in Fig. A-11i. Anchor bolts cast into the foundation restrain the bottom of the shield. An anchor plate for a corner is shown in Fig. A-10. Anchors for the sidewall members are similar.

The doorway shown in Figs. A-7 and A-11 is a hinged door and depicts the shield configuration that was proof tested. A sliding door such as utilized with the Group 4 shield would be preferable for an operational installation. Such a sliding door for the Group 5 shield has been designed and is described in Chapter 6.

A.4.2 Application

The Group 5 shield has been developed primarily for operations involving propellants and pyrotechnics. Since unconfined propellant tends to burn at a constant rate and confined propellant tends to burn at a faster rate with increasing pressure and temperature, venting is very important when the shield is used for a propellant application. The Group 5 shield design has been tested and safety approved for up to 30 pounds of pyrotechnic material. Ignition of 30 pounds of pyrotechnic (55 percent NaNO₃ and 45 percent magnesium granules) resulted in no blast pressure outside the shield. The fireball was restricted to within two feet of the shield, and small acceptor batches (< 1 lb) of illuminant composition three feet from the shield were not ignited.

Since the Group 5 shield is designed primarily to suppress large fireballs resulting from deflagration/burning of pyrotechnic materials, a typical application would be for an igniter slurry mixing operation. It is suitable for use in connection with munition operations or storage involving up to 30 pounds of pyrotechnic material in a working volume of $10.4 \times 10.4 \times 8.5$ feet, or more. Such use must be compatible with ignition of illuminant composition within three feet of the shield and a fireball that extends two feet beyond the shield exterior walls.

The design is also suitable for operations involving detonating munitions up to 1.84 pounds of C-4 explosive, or equivalent, and a fragment threat that can be defeated by 0.427 inch of mild steel. Such application would be limited to the same working volume specified above and must be compatible with an external pressure of 2.3 psi up to 3.7 feet from the exterior of the shield.

The Group 5 shield can be used in installations where the requirements are compatible with

- A maximum square floor plan measuring 10.4 feet on a side clear internal working space with a maximum clear working height of 8.5 feet.
- Charge weights up to 1.84 pounds of C-4 explosive, or equivalent (1.98 lb TNT equiv; maximum W/V ratio = $0.00215 \text{ lb}/\text{ft}^3$; minimum $Z = 4.14 \text{ ft}/\text{lb}^{1/3}$ at sidewalls and minimum $Z = 6.79 \text{ ft}/\text{lb}^{1/3}$ for roof. Note that the charge is not located at mid-height of the shield in this case.)
- An external pressure of 2.3 psi up to 3.7 feet from the exterior of the shield and a fireball that extends two feet outside the shield.

- Fragments that are incapable of perforating 0.427 inch of mild steel.
- 30 pounds of pyrotechnic materials.

A.4.3 Modification

Modification of the Group 5 shield design as safety approved would be subject to the same considerations discussed above for the Group 4 shield. That is, the length could be increased in modular panel increments provided Z is not decreased and W/V is not increased. The fragment threat for the application of interest must be defeated by the Group 5 shield nominal wall thickness (0.427 in).

A.5 SHIELD GROUP 6

A.5.1 Description

Shield Group 6 consists of two designs which have been safety approved. These two designs, designated Group 6A and 6B, are shown in Figs. A-12 and A-13, respectively. Both shields are spherical in configuration with a 24-inch interior diameter and a nominal steel wall thickness of 1/4 inch.

a. Group 6A

The Group 6A design consists of two hemispherical shells of 1/4-inch mild steel welded together. The shield is shown schematically in Fig. A-14; the fabrication drawings are presented in Fig. A-15. An access opening to the interior is provided by a 7-1/2-inch diameter hole. The opening is reinforced by an external ring proportioned in accordance with standard penetration reinforcing methods such as the ASME pressure vessel code. The closure for the access opening is an 8-inch diameter circular plate 3/8 inch thick which hinges inward. There is an external bar to securely latch the closure shut.

A vertical pipe on the centerline of the sphere supports a revolving tray for ease in dispensing the hazardous

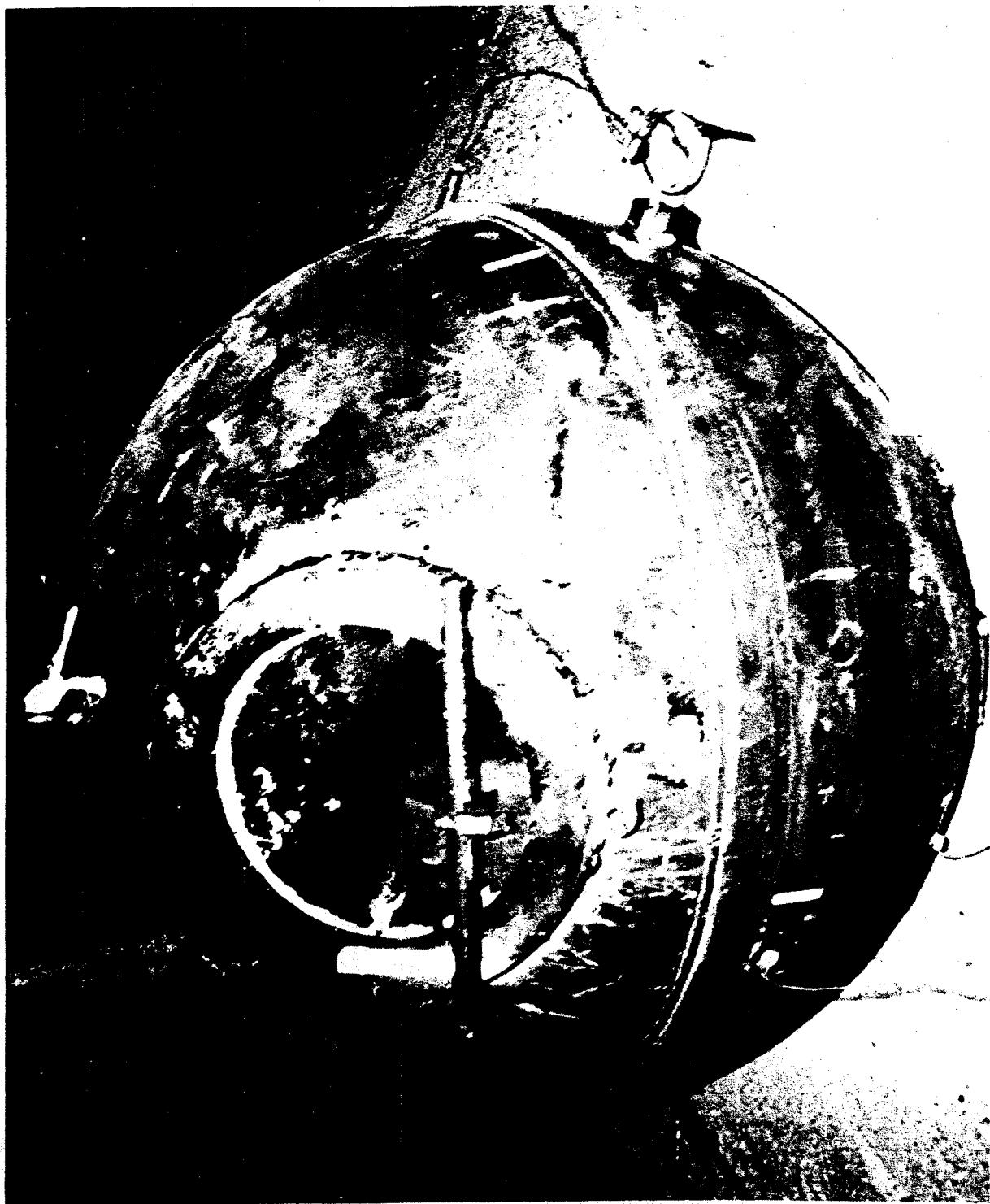


Figure A-12. Group 6A Suppressive Shield



Figure A-13. Group 6B Suppressive Shield

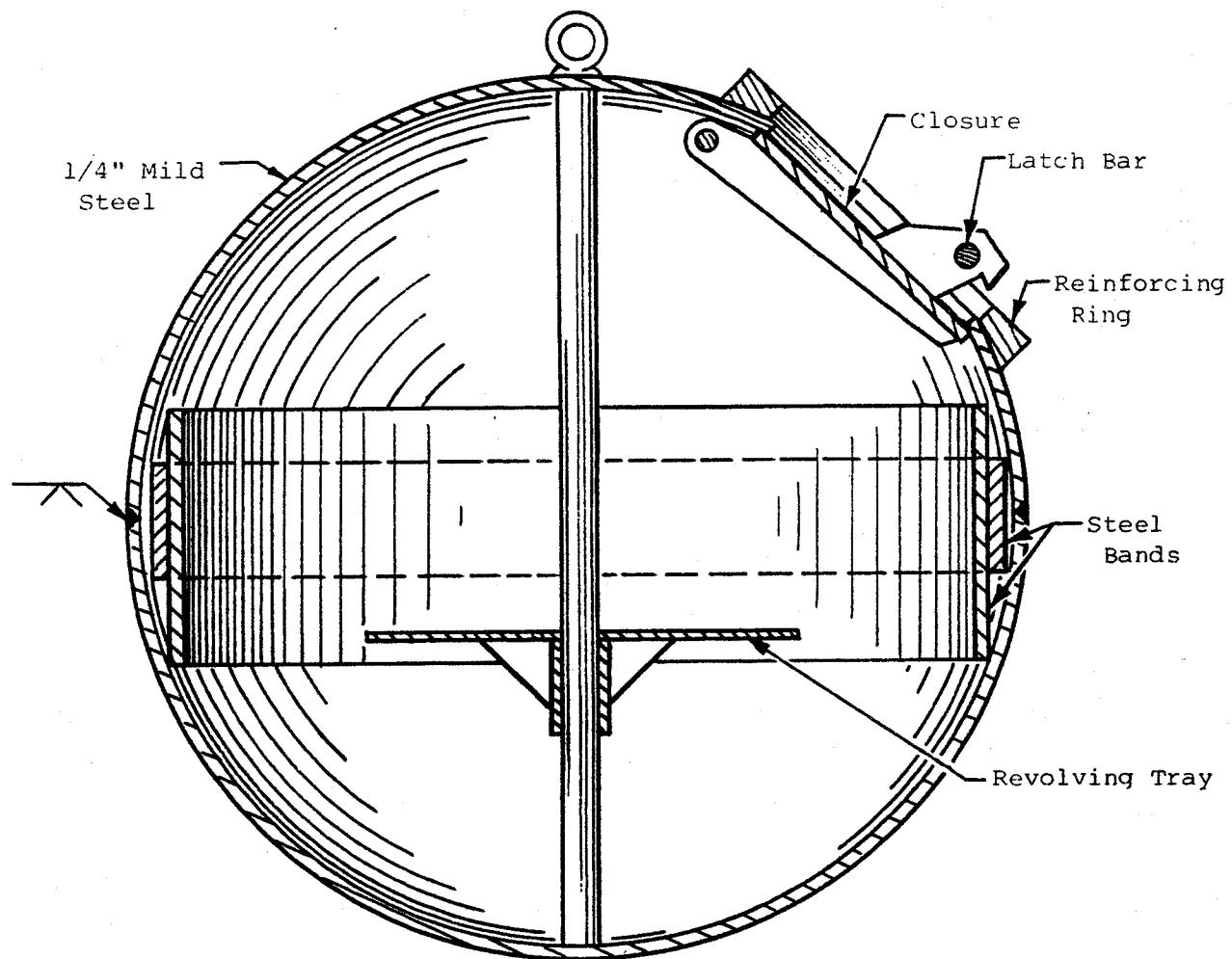


Figure A-14. Group 6A Shield Schematic

items to be contained within the shield. Additional belts of steel plate surround the revolving table in the region where blast and fragment effects are the greatest. The innermost belt is a 7.0-inch wide x 0.25-inch thick band. A narrower band measuring 3.5 inches wide by 0.5 inch thick is situated between the spherical shell and the wider band. The bands counteract blast loads by developing hoop stresses while the spherical shell resists the loads with membrane stresses.

b. Group 6B

Shield Group 6B is fabricated of stainless steel. The design is shown schematically in Fig. A-16; the fabrication drawings are presented in Fig. A-17. The two hemispherical halves of the shield are joined together by a strip of steellapping the joint welded to each hemispherical shell. A circular steel ring is provided as a base to maintain the shield in an upright position. The opening in the spherical shell measures 8.0 inches in diameter and is reinforced with a steel ring.

The closure system consists of two circular flat plates. One swings internally and sideward away from the opening, and the external plate hinges from the outer surface of the sphere. The internal portion is a 8.50-inch diameter x 0.75 inch thick steel plate and is supported by a yoke attached to the top and bottom of the sphere. The outer plate is a flat circular steel disk measuring 10.0 inches in diameter x 0.5 inch thick. A latching handle projects from the outer plate. The latch is locked when a projection from the outer closure disk engages a striker on the inner disk.

The storage tray inside the sphere is permanently fixed in position. Additional blast and fragment liners were not included in the Group 6B design because of the smaller fragment hazard involved.

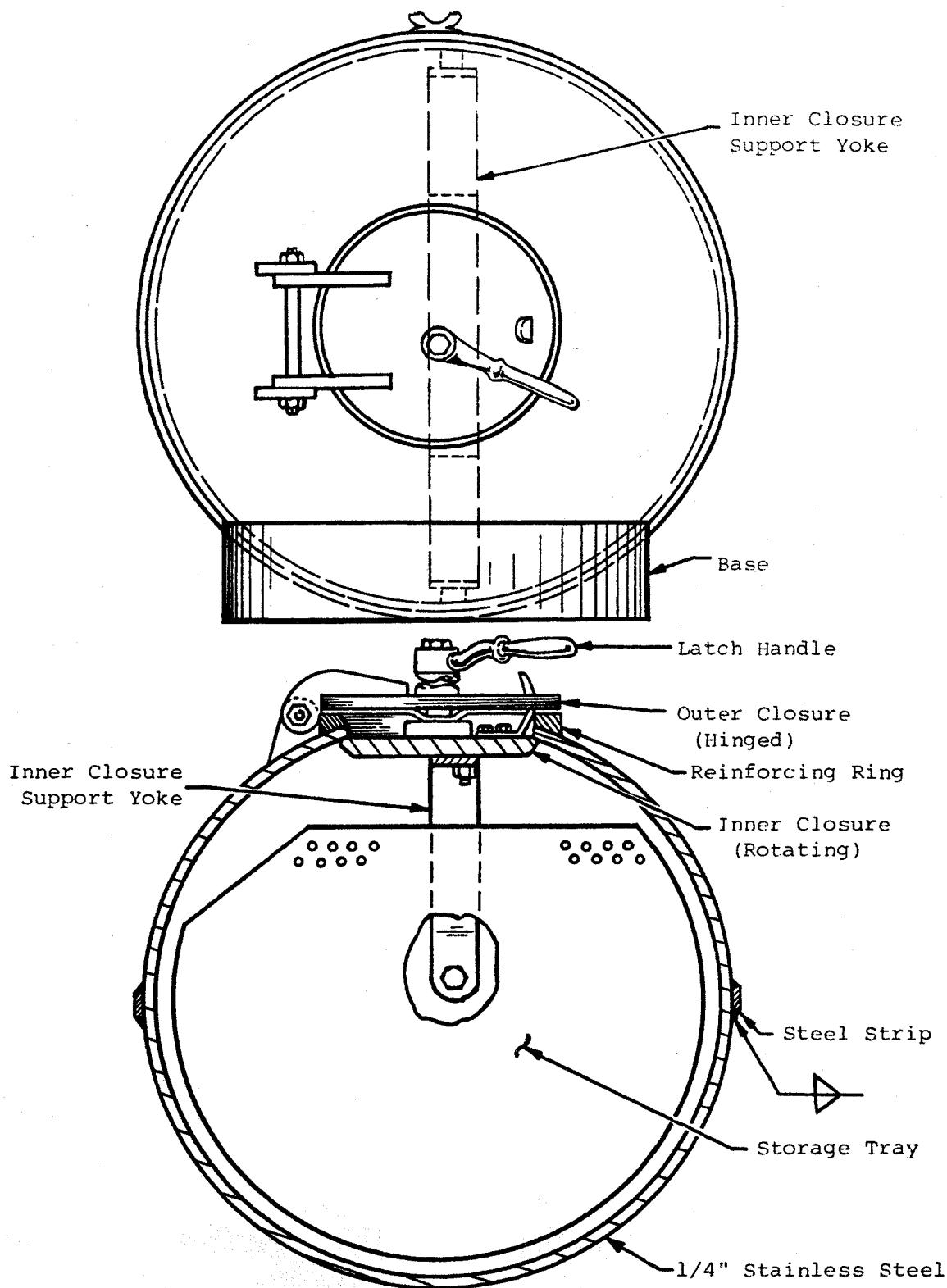
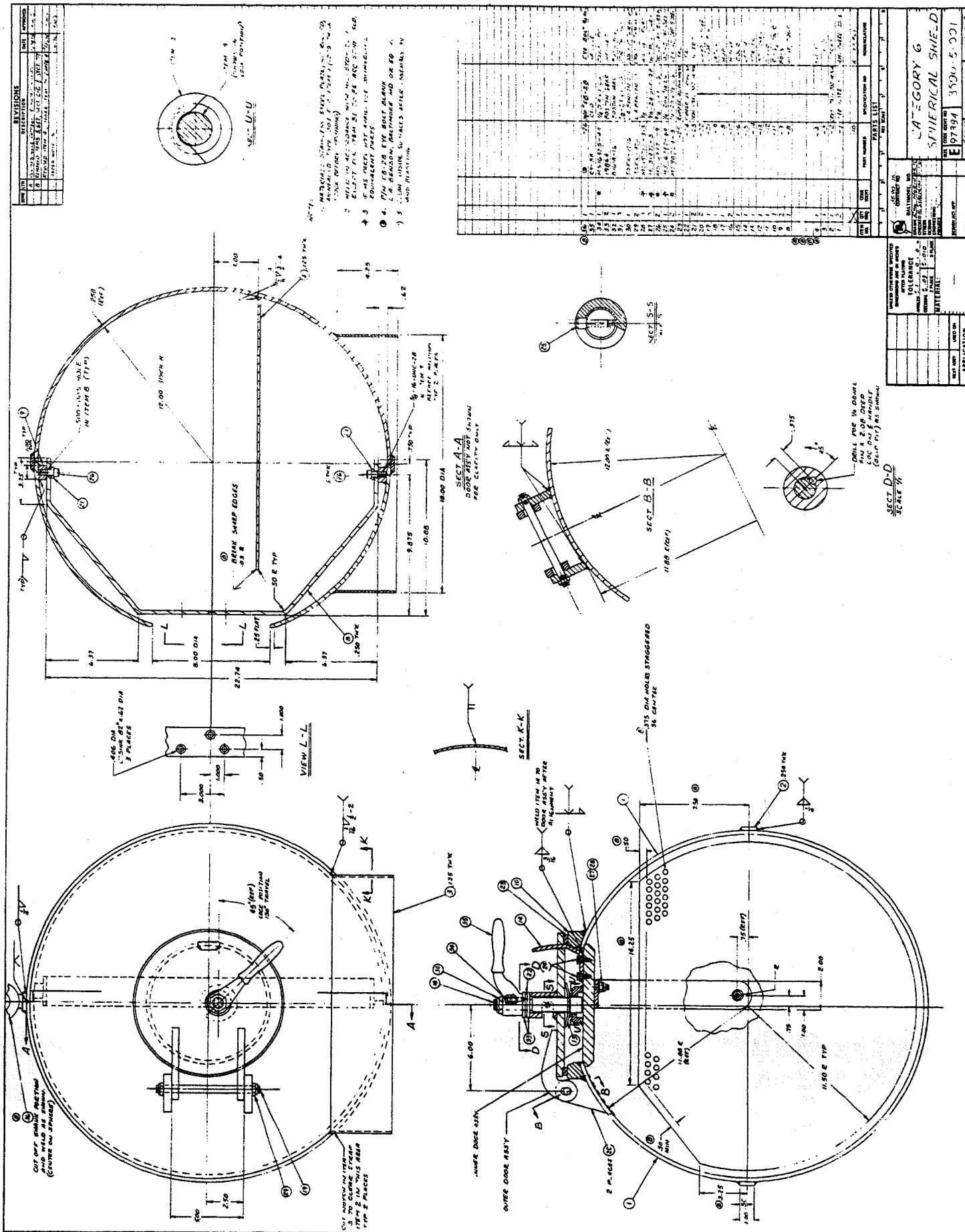
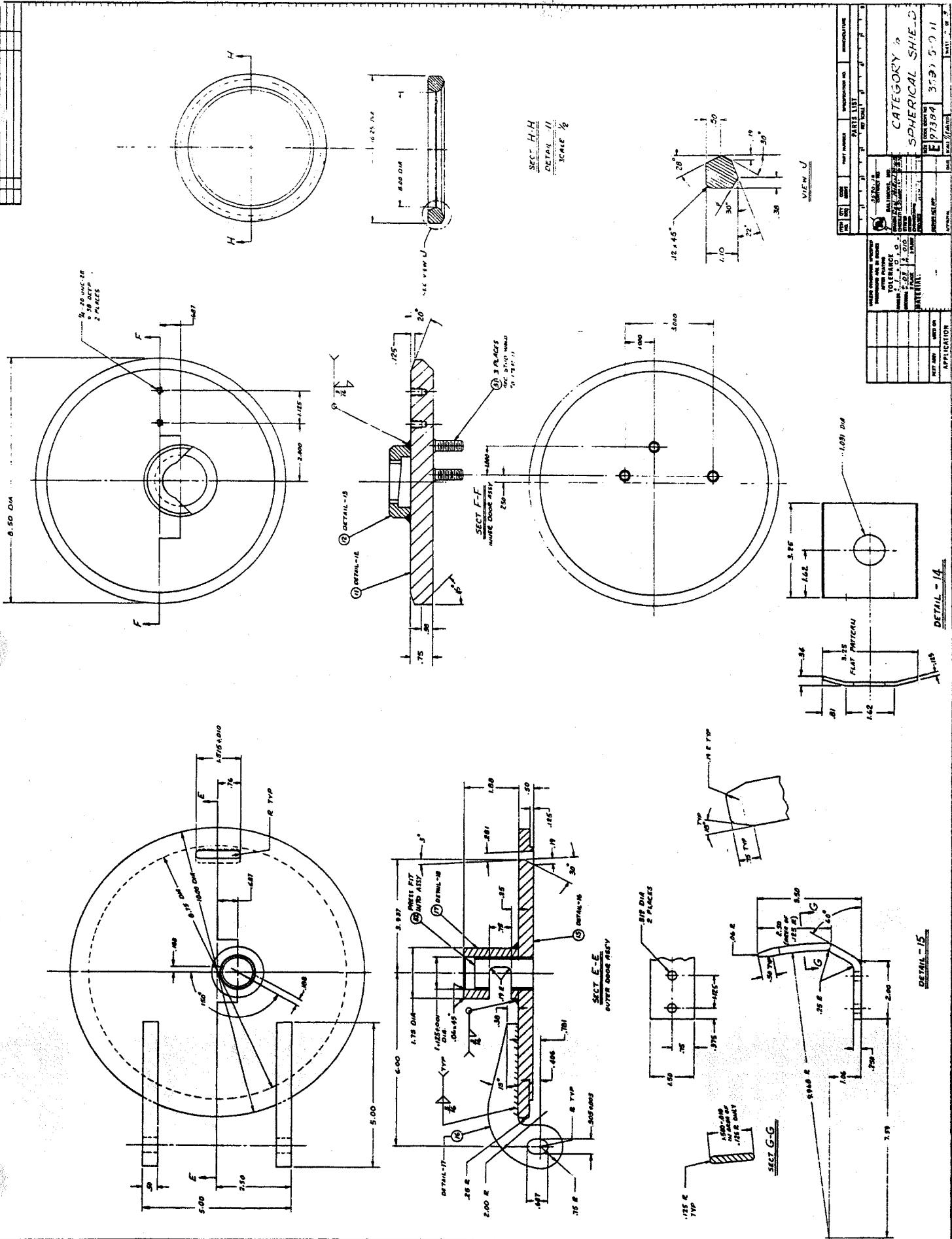
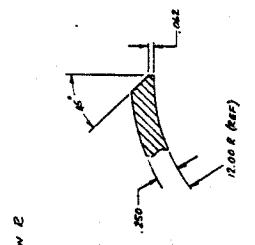


Figure A-16. Group 6B Shield Schematic



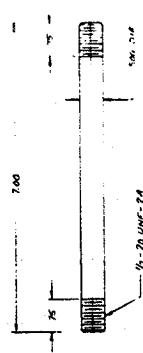
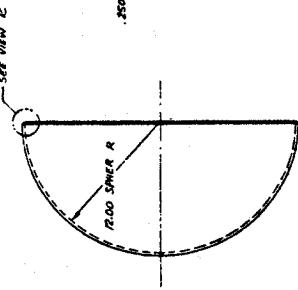


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Designated Drawing No.	100-1000
Date Issued	10-10-68
Revised	10-10-68
Approved	10-10-68

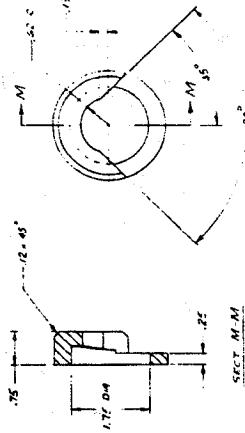


$\frac{12.00}{20.00 \times 2}$

DETAIL - 1
SCALE $\frac{1}{4}$



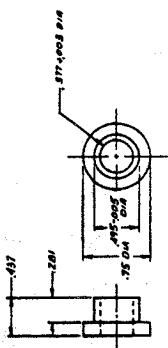
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SCALE $\frac{1}{4}$



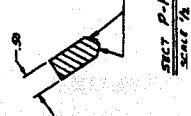
SECT. M-M



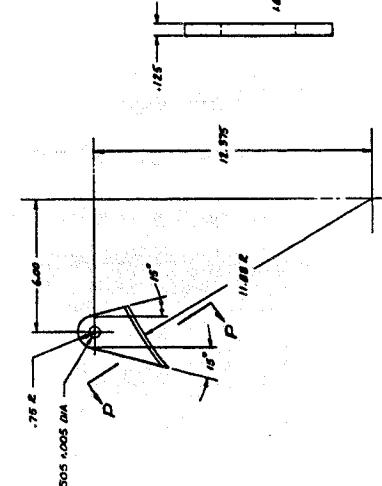
DETAIL - 3
SCALE $\frac{1}{4}$



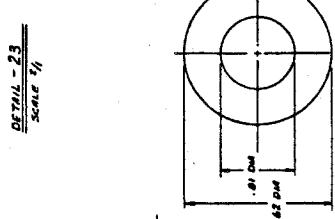
DETAIL - 23
SCALE $\frac{1}{4}$



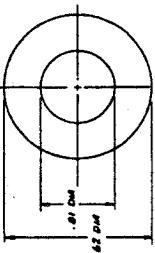
DETAIL - 24
SCALE $\frac{1}{4}$



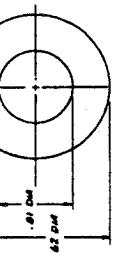
DETAIL - 22
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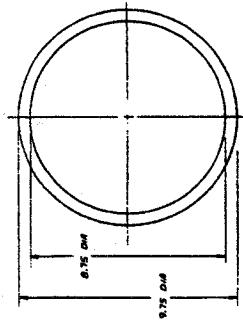
DETAIL - 24
SCALE $\frac{1}{4}$



DETAIL - 24
SCALE $\frac{1}{4}$



DETAIL - 22
SCALE $\frac{1}{4}$



DETAIL - 25
SCALE $\frac{1}{4}$

HELICAL SURFACE
PK SQ TWO FORM
LEAD - 350 u/in

DETAIL - 19
SCALE $\frac{1}{4}$

Part No.	100-1000	Rev. No.	Prepared by	Checked by	Supervised by	Approved by
Designation	100-1000	1				
Date Issued	10-10-68					
Revised	10-10-68					
Approved	10-10-68					

Part No.	100-1000	Rev. No.	Prepared by	Checked by	Supervised by	Approved by
Designation	100-1000	1				
Date Issued	10-10-68					
Revised	10-10-68					
Approved	10-10-68					

A.5.2 Application

Typical applications of these shield designs would be to safely transport or store small quantities of explosives between operations such as in a detonator loading facility or in a laboratory.

a. Group 6A

The group 6A design has been tested and safety approved for detonation of a single charge of 13.63 ounces of 50/50 pentolite, or equivalent, and a maximum reflected pressure on the interior shield surface of 6900 psi. The charge weight may also be made up of equally spaced 1/2-ounce 50/50 pentolite charges located 3 inches or more from the wall so that the calculated reflected overpressure on the wall does not exceed 11,400 psi. The fireball and fragments, if any, from the test charge are completely contained by the shield. External pressure is considerably less than 2.3 psi (approximately 1 psi) at a distance of two feet from the shield.

The Group 6A design would be applicable to munition operations that

- Utilize 13.63 ounces of 50/50 pentolite, or equivalent (0.962 lb TNT equiv; maximum W/V ratio = 0.2297 lb/ft³; minimum Z = 1.013 ft/lb^{1/3}; W/V ratio and Z values will be different for 0.5 oz distributed charges.)
- Require a maximum working volume equal to a 2-foot diameter sphere.
- Are compatible with external pressure less than 2.3 psi two feet from the shield.
- Produce fragments that will not penetrate one-quarter inch of mild steel.

b. Group 6B

The Group 6B design has been tested and approved for use as a storage container in applications requiring a safety shield to contain 8.23 ounces of C-4 explosive, or equivalent. The charge weight may be made up of equally spaced 0.4-ounce C-4 charges located 3 inches or more from the wall so that the calculated reflected overpressure does not exceed 9800 psi. Larger charges (up to a total of 8.23 ounces) must be located far enough from the shield wall so that the calculated reflected overpressure does not exceed 4900 psi. Blast pressure is reduced well below 2.3 psi (approximately 0.2 psi) at a distance of one foot from the shield; the fireball is completely contained within the shield.

The Group 6B design is adaptable to applications that

- Involve 8.23 ounces of C-4 explosive
(0.5545 lb TNT equiv.; maximum W/V ratio
= 0.132 lb/ft³; minimum Z = 1.217 ft/
lb^{1/3}; W/V ratio and Z values will be
different for 0.4-oz distributed charges.)
- Require a working volume available in a
2-foot maximum spherical diameter.
- Are compatible with an external pressure
less than 2.3 psi two feet from the shield.
- Are located in a corrosive environment
requiring a stainless steel vessel.
- Produce no fragments that cannot be de-
feated by one-quarter inch of stainless
steel.

A.5.3 Modification

There are no simple, straightforward rules for modifying the Group 6 shield designs. They may not, of course,

be used for applications involving a larger charge or more severe fragment threat than that for which the designs have been approved. Similarly, the diameter may not be decreased for the rated charge weight. Increasing the diameter for the rated charge weight would require careful analysis using the methods presented in Chapter 5.

A.6 SHIELD GROUP 81-mm

The Group 81-mm shield was the first suppressive shield design to be safety approved. This shield group has two design versions, both of which are rectangular parallelopipeds made up of a structural steel frame supporting vented panels. One version will be designated the Prototype 81-mm Shield; the other will be called the Milan 81-mm Suppressive Shield.

A.6.1 Description

a. Prototype 81-mm Shield

The Prototype 81-mm Shield design shown in Fig. A-18 is approximately 15.4 feet wide by 13.1 feet high by 20 feet long on the outside and 14 feet wide by 12.4 feet high by 18.7 feet long on the inside.

The frame consists of structural steel tubes. All corner members, including ceiling corner members, are constructed of two 1/4 inch thick tubes, one of which is 8 inches by 4 inches and the other 4 inches square. These tubes are welded together the full length of the tubes to form an L as shown in Fig. A-19, the shield fabrication drawings. All vertical members of the frame (except corners) are 8 x 6 x 1/4 structural steel tubes. The horizontal ceiling members (except corners) are 8 x 6 x 3/8 structural steel tubes.

The wall panels are 4 feet by 12 feet and the ceiling panels are 4 feet square. The panel cross section is shown in Fig. A-18 and is the same for both wall and ceiling

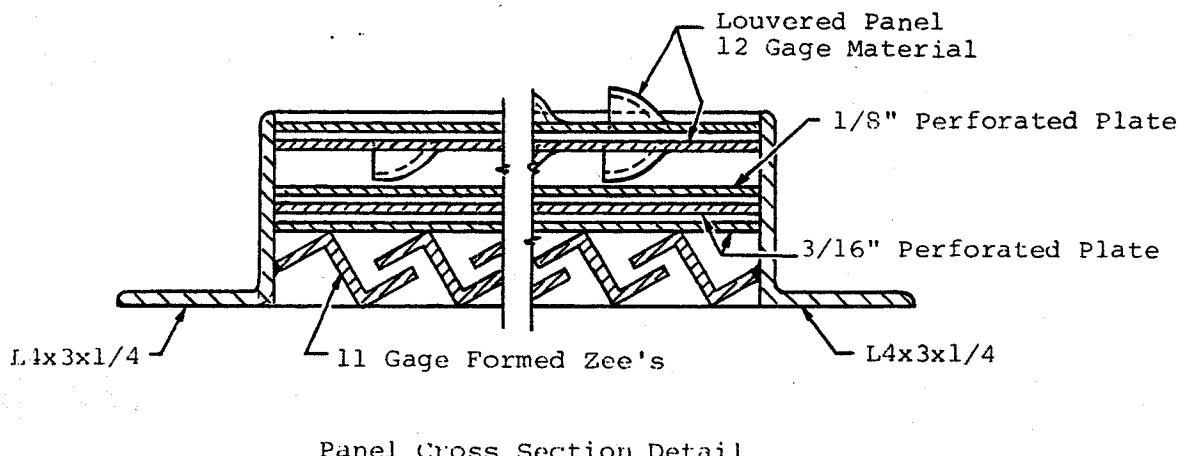
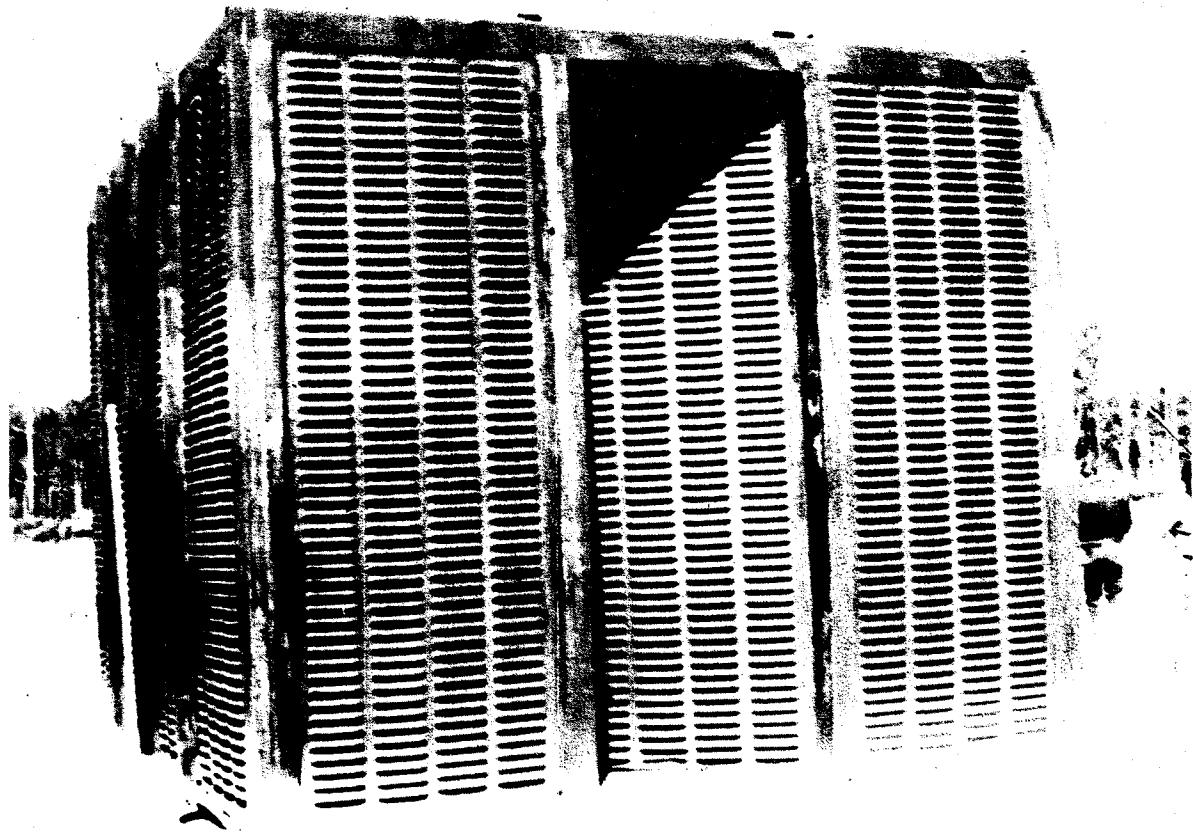
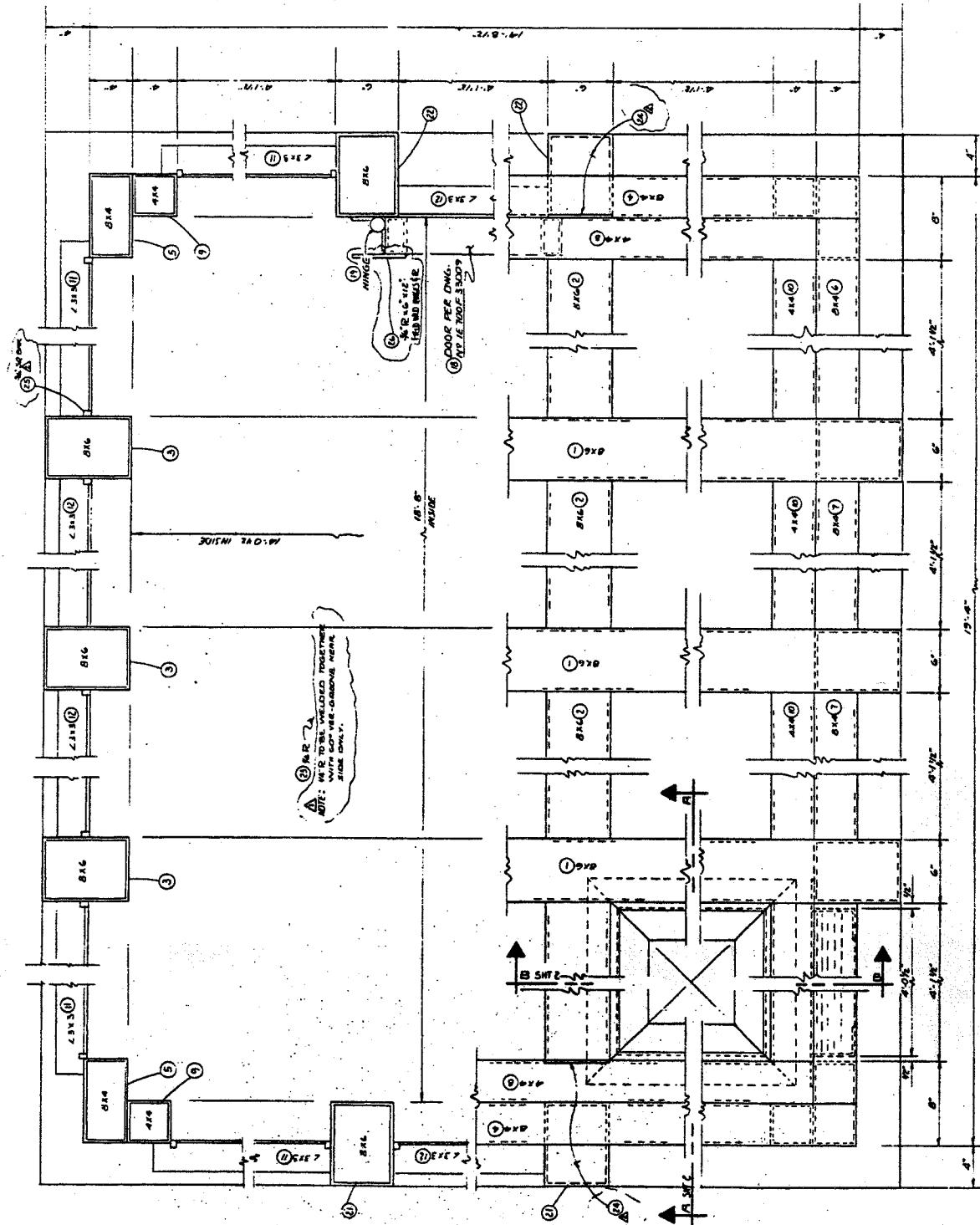


Figure A-18. Prototype 81-mm Suppressive Shield

ITEM	QUANTITY	LENGTH	WEIGHT/UNIT
3	1	15'-0 7/8"	54.63 lb/STEEL
5	2	41'-1 1/8"	84.6 lb
6	3	12'-5"	34.6 lb
2	4	19'-8 1/2"	81.4 lb
5	2	12'-1"	18.4 lb
4	5	4'-5 1/8"	18.4 lb
4	7	4'-1 1/2"	18.4 lb
2	8	4'-0 1/8"	18.4 lb
2	9	22'-1"	22.4 lb
8	10	4'-0 1/8"	18.4 lb
8	11	2'-1 1/2"	3 x 3 x 1/8"
6	12	4'-0 1/2"	3 x 3 x 1/8"
5	13	7'0"	3/8" IR x 2 1/8"
5	14	4'	1/8" STAINLESS STEEL WEDGE (SPL)
2	15	STAINLESS STEEL	2 PANELS PRE-DRILLED (TOP) 100F 3/008Z16-700 F 1.00081
1	16	16'	1/8" PANELED BACK PLATE OF 100F 3/00816
2	17	10'	HINGES (TYPE 1 3000 LBS CAPACITY) (1 EACH)
2	18	10'	1/8" IR ST. ROD
2	19	10'	BIG FLAT IRREGULAR SECT. 1/8" STEEL
2	20	22'-1"	1/8" IR x 15'-4"
1	21	20'-0"	1/8" IR x 4'-0" (CUT & BEAM END CLOSURE)
4	22	24"	3/8" IR x 4'-0" (CUT & BEAM END CLOSURE)
2	23	25'-0"	3/8" IR x 15'-4" (CUT & BEAM END CLOSURE)
2	24	25'-0"	3/8" IR x 15'-4" (CUT & BEAM END CLOSURE)
2	25	25'-0"	3/8" IR x 15'-4" (CUT & BEAM END CLOSURE)
2	26	25'-0"	3/8" IR x 15'-4" (CUT & BEAM END CLOSURE)
2	27	25'-0"	3/8" IR x 15'-4" (CUT & BEAM END CLOSURE)
1	28	25'-0"	3/8" IR x 15'-4" (CUT & BEAM END CLOSURE)
1	29	25'-0"	3/8" IR x 15'-4" (CUT & BEAM END CLOSURE)
1	30	25'-0"	3/8" IR x 15'-4" (CUT & BEAM END CLOSURE)
1	31	25'-0"	3/8" IR x 15'-4" (CUT & BEAM END CLOSURE)

51-60602 REGULAR SET. RIG. SHEET

INCHES ALL DIMENSIONS ARE IN INCHES



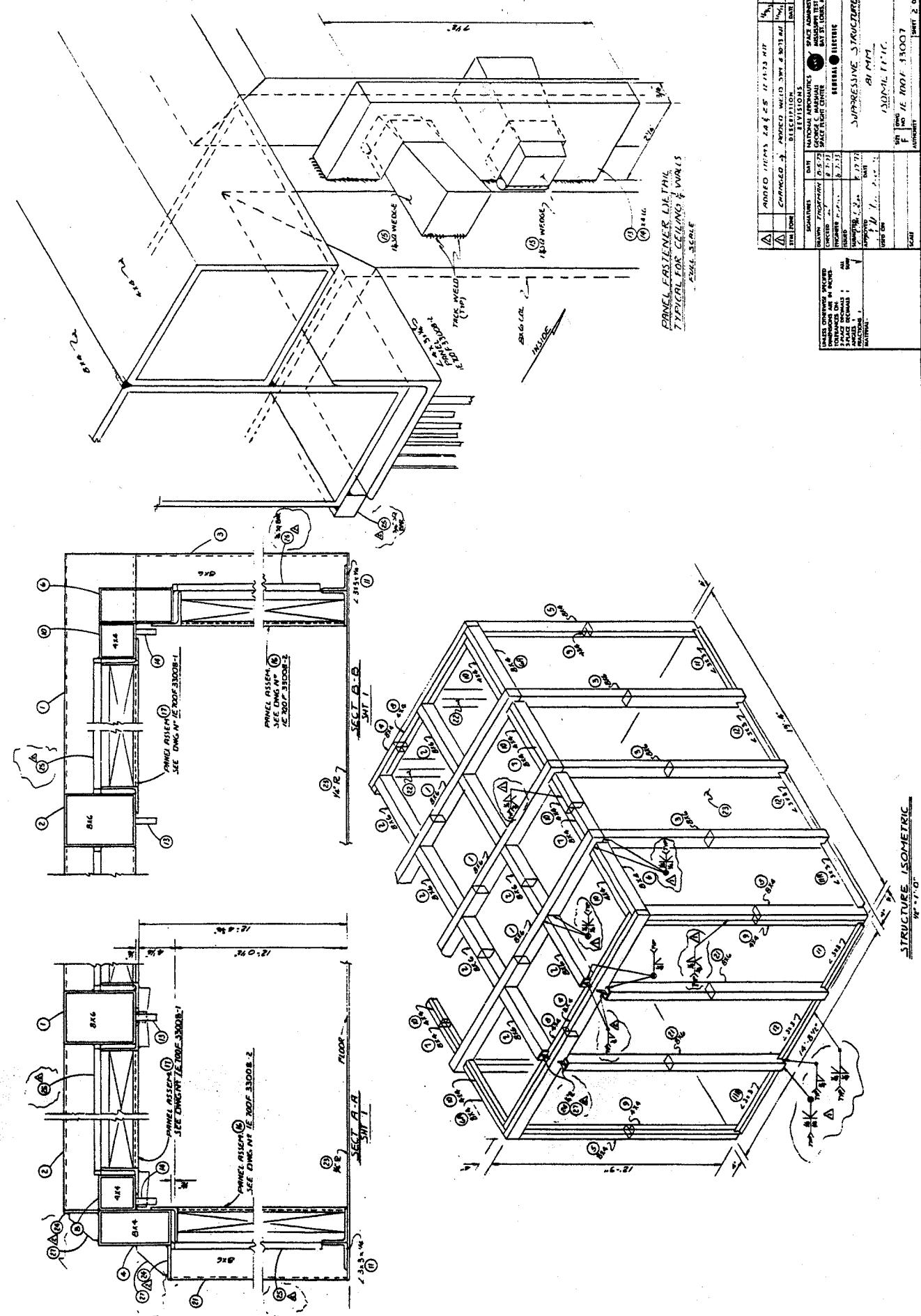
**PLAN VIEW
SUPPRESSIVE STRUCTURE**

3'-0" X 1'-0"

ATTACHED	ADCO ITEM'S NO. 24.15.67.17 1/8-23 MM
A/	JOYCE NOTE FROM WILDLINE, MAY 2013
THIS FORM	ELECTRICAL
REVISIONS	DRAFT
DESCRIPTIONS	REMARKS
DISPOSITIONS	REMARKS
REMARKS	REMARKS
UNDER DRIVING SPECIFIED STRUCTURE ARE AS FOLLOWS: -FRAMING, ANGLES AND CHANNELS -STUDS, CLEATS, SCREWS, -SHOOTS, NAILS; -WELDING; -FLASHERS, COATINGS; -ANTI-SEIZURE, -PROTECTIVE PAINTS, -INSULATIONS; -BUSHINGS;	
NOTICE FROM WILDLINE, MAY 2013:	
1) WILDLINE, INC. 2) NOTIFICATION OF THE CONTRACTOR THAT THE STRUCTURE IS BEING MANUFACTURED; 3) APPROVAL OF THE STRUCTURE DESIGN; 4) CONSTRUCTION, INSPECTION AND MANUFACTURE OF THE STRUCTURE; 5) PREPARATION FOR TRANSPORTATION, INSTALLATION AND OPERATION;	
NOTICE FROM ADCO, JUNE 2013:	
1) WILDLINE, INC. 2) CONSTRUCTION, INSPECTION AND MANUFACTURE OF THE STRUCTURE; 3) PREPARATION FOR TRANSPORTATION, INSTALLATION AND OPERATION;	
NOTICE FROM WILDLINE, JULY 2013:	
1) ADCO (EQUIPMENT) 2) WILDLINE (STRUCTURE)	
NOTICE FROM WILDLINE, AUGUST 2013:	
1) ADCO (EQUIPMENT) 2) WILDLINE (STRUCTURE)	
NOTICE FROM ADCO, SEPTEMBER 2013:	
1) WILDLINE (STRUCTURE)	
NOTICE FROM WILDLINE, OCTOBER 2013:	
1) ADCO (EQUIPMENT)	
NOTICE FROM WILDLINE, NOVEMBER 2013:	
1) ADCO (EQUIPMENT)	

ADCO AUTHORITY
WILDLINE AUTHORITY
NOV 2013 100F 3-007 1/4 MM

Figure A-19b. Prototype 81-mm Shield Construction Details (continued)



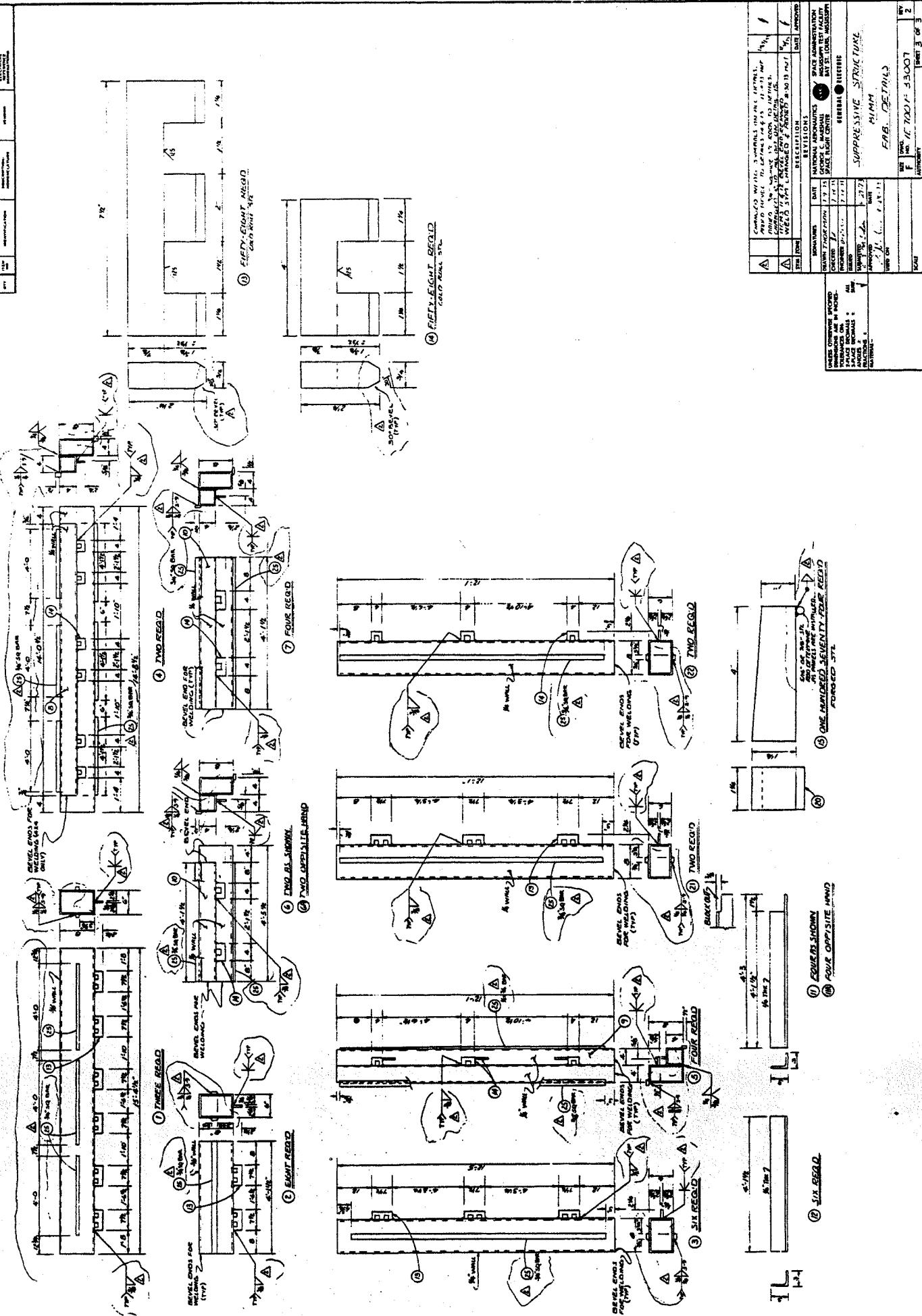
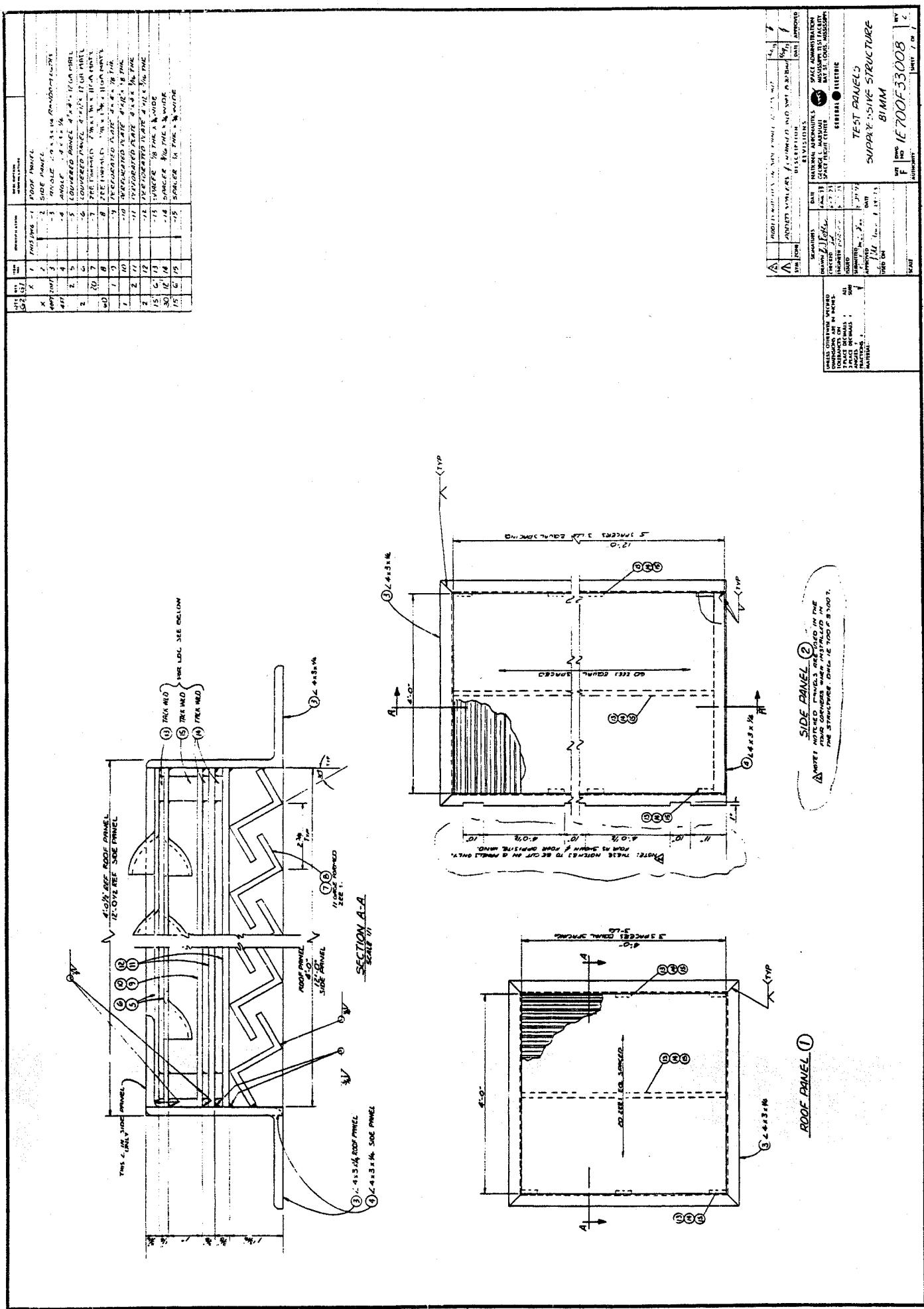
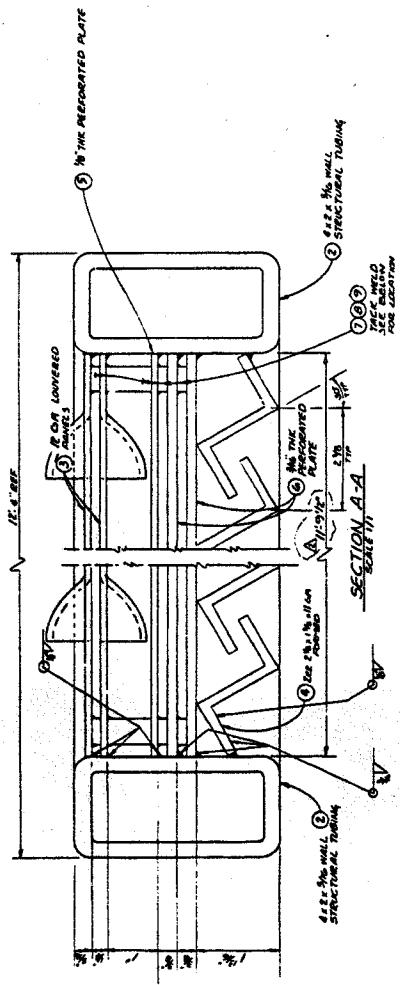


Figure A-19c. Prototype 31-mm Shield Construction Details (continued)

Figure A-19d. Prototype 81-mm Shield Construction Details (concluded)



REV	DATE	DESCRIPTION
X	1967-01-01	DOOR
1	1967-01-01	STRUCTURAL PLATE
2	1967-01-01	COVERED PANEL
3	1967-01-01	STRUCTURE
4	1967-01-01	STRUCTURE
5	1967-01-01	STRUCTURE
6	1967-01-01	STRUCTURE
7	1967-01-01	SPACER
8	1967-01-01	SPACER
9	1967-01-01	SPACER



panels. The panels are mounted from the inside of the structure and wedged tight against the frame as shown in the Panel Fastener Detail on Fig. A-19b.

The base of the shield consists of a 1/4-inch steel plate. The lower ends of the vertical frame members and the bottom support angles for the wall panels are welded to this base plate.

A 4 x 12-foot door is provided at the center of one end of the shield. The door has the same cross section as the wall and roof panels, except that it is framed with 4 x 2 x 5/16 structural steel tube instead of angles.

b. Milan 81-mm Suppressive Shield

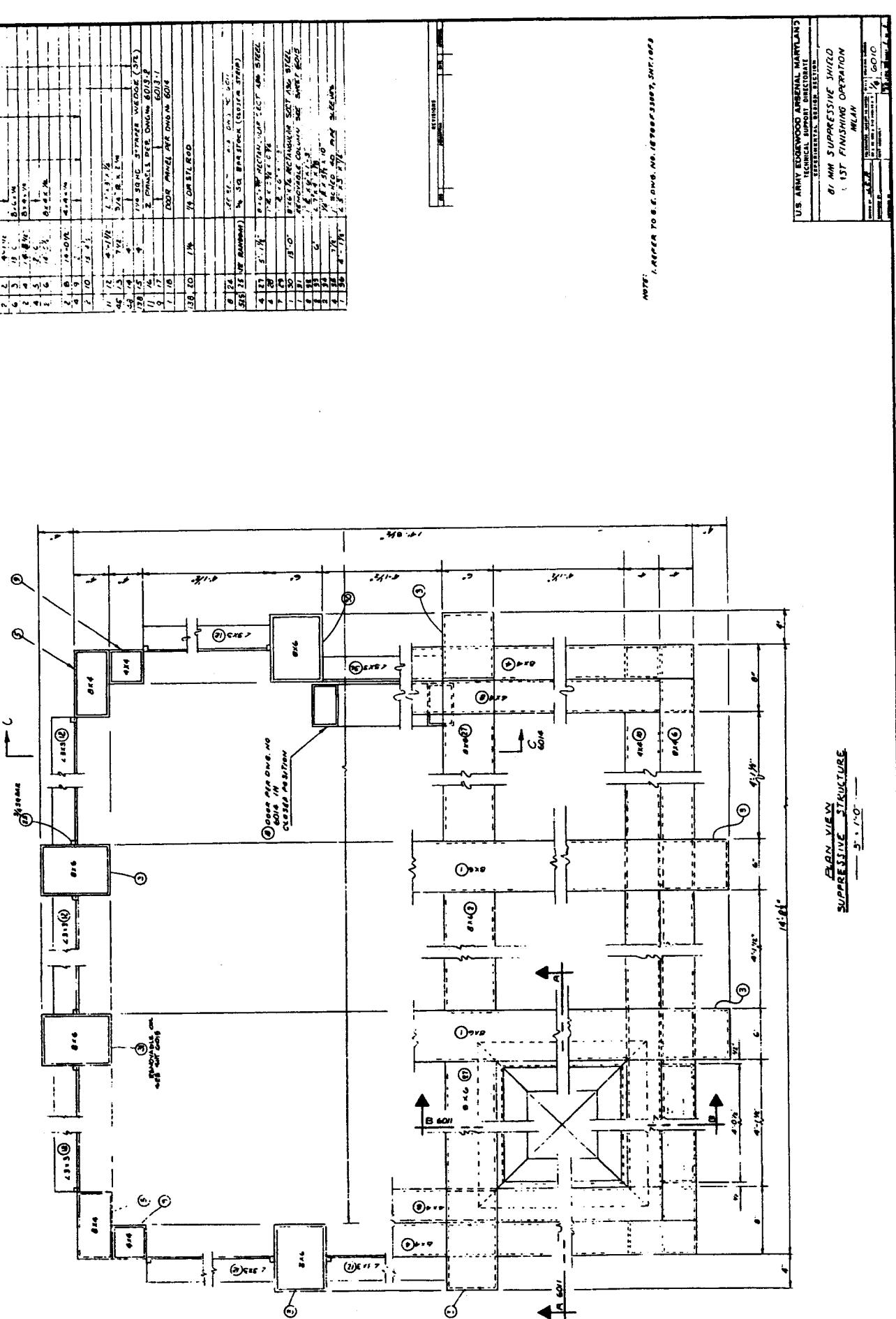
The Milan adaptation is quite similar to the Prototype 81-mm Shield; see Fig. A-20. The primary differences between the two versions are

- Square, rather than rectangular, floor plan.
- Revised design of the structural frame corners.
- Sliding access door.
- Inclusion of provisions for anchoring the shield to a reinforced concrete foundation.
- Inclusion of provisions for a removable vertical frame member (column) to permit a larger access opening.

The outside dimensions of the Milan 81-mm shield are approximately 15.4 feet wide by 15.4 feet long by 13.1 feet high. The inside dimensions are 14 feet wide by 14 feet long by 12.4 feet high.

The structural frame corner design was modified as a result of the tests conducted on the Prototype 81-mm

Figure A-20a. Milan 81-mm Suppressive Shield Construction Details



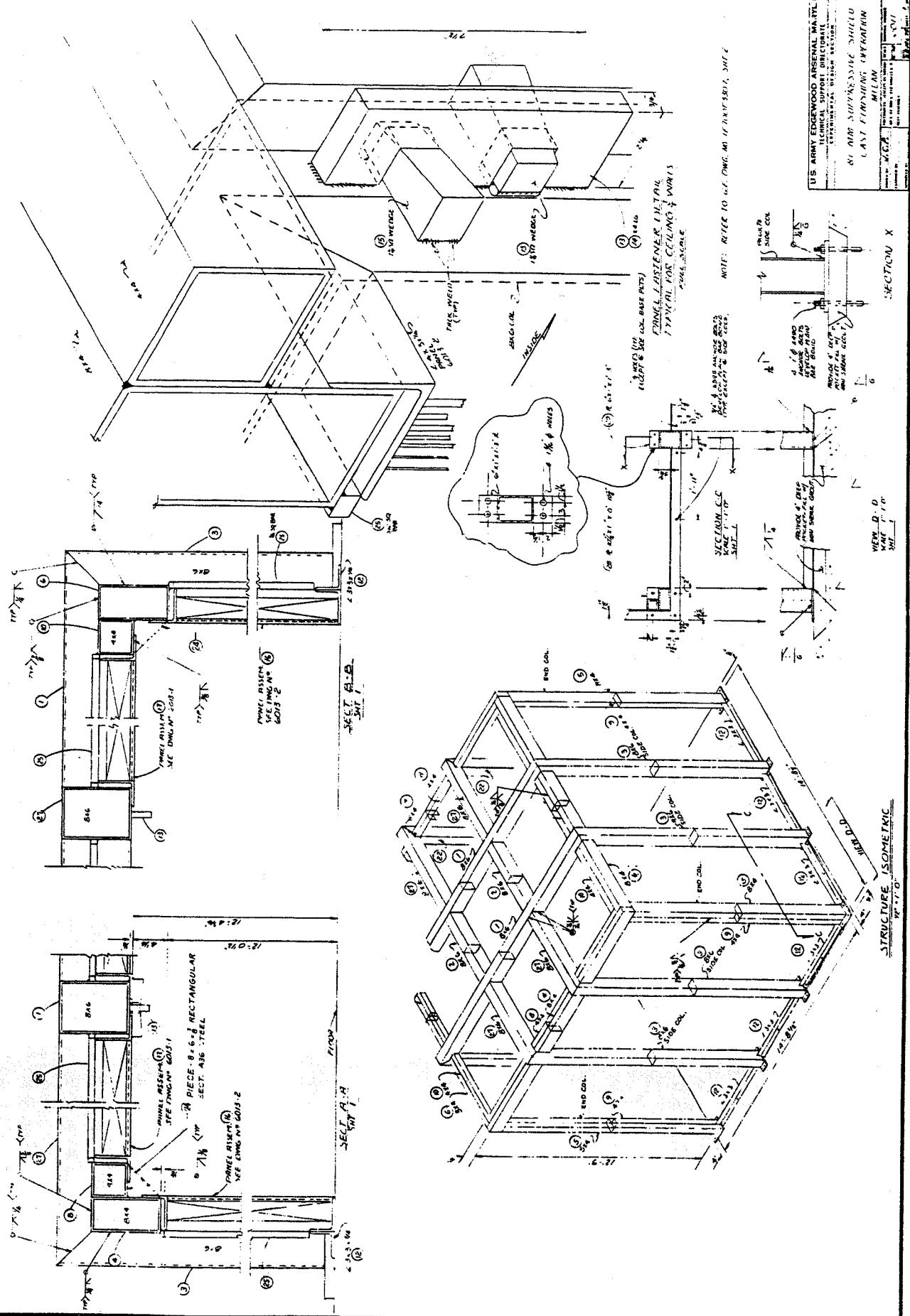


Figure A-20b. Milan 81-mm Suppressive Shield Construction Details (continued)

Figure A-20c. Milan 81-mm Suppressive Shield Construction Details (continued)

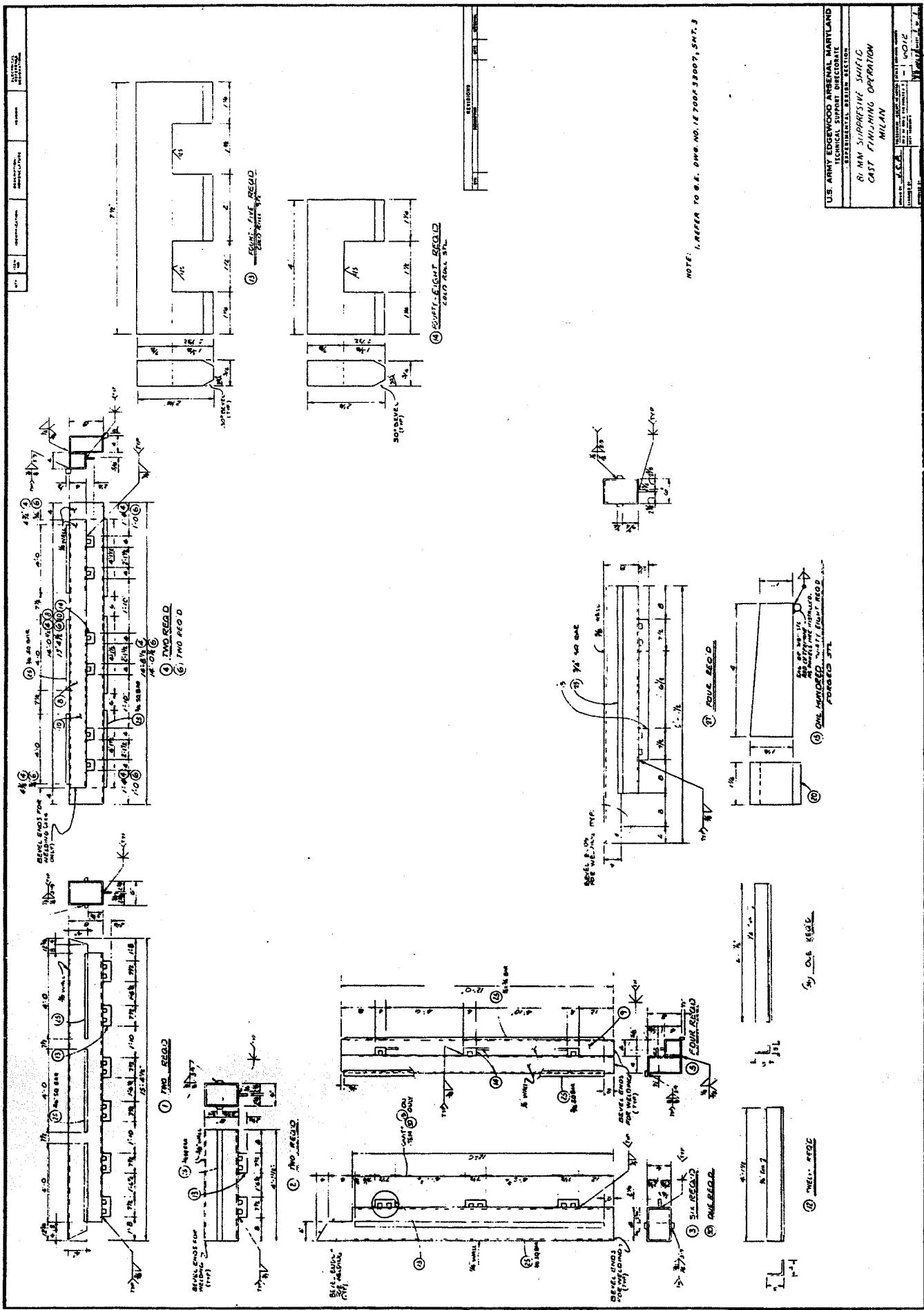
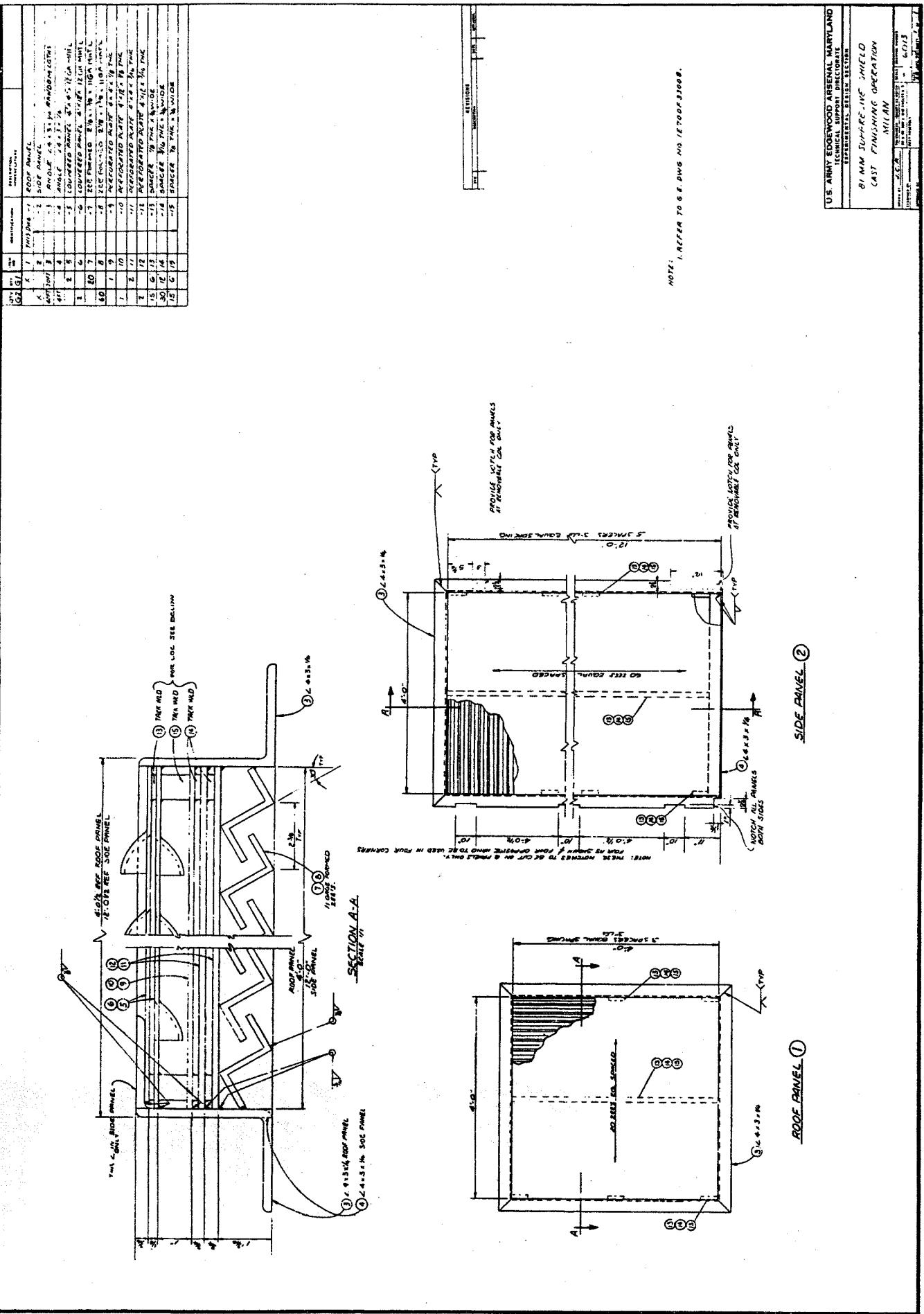


Figure A-20d. Milan 81-mm Suppressive Shield Construction Details (continued)



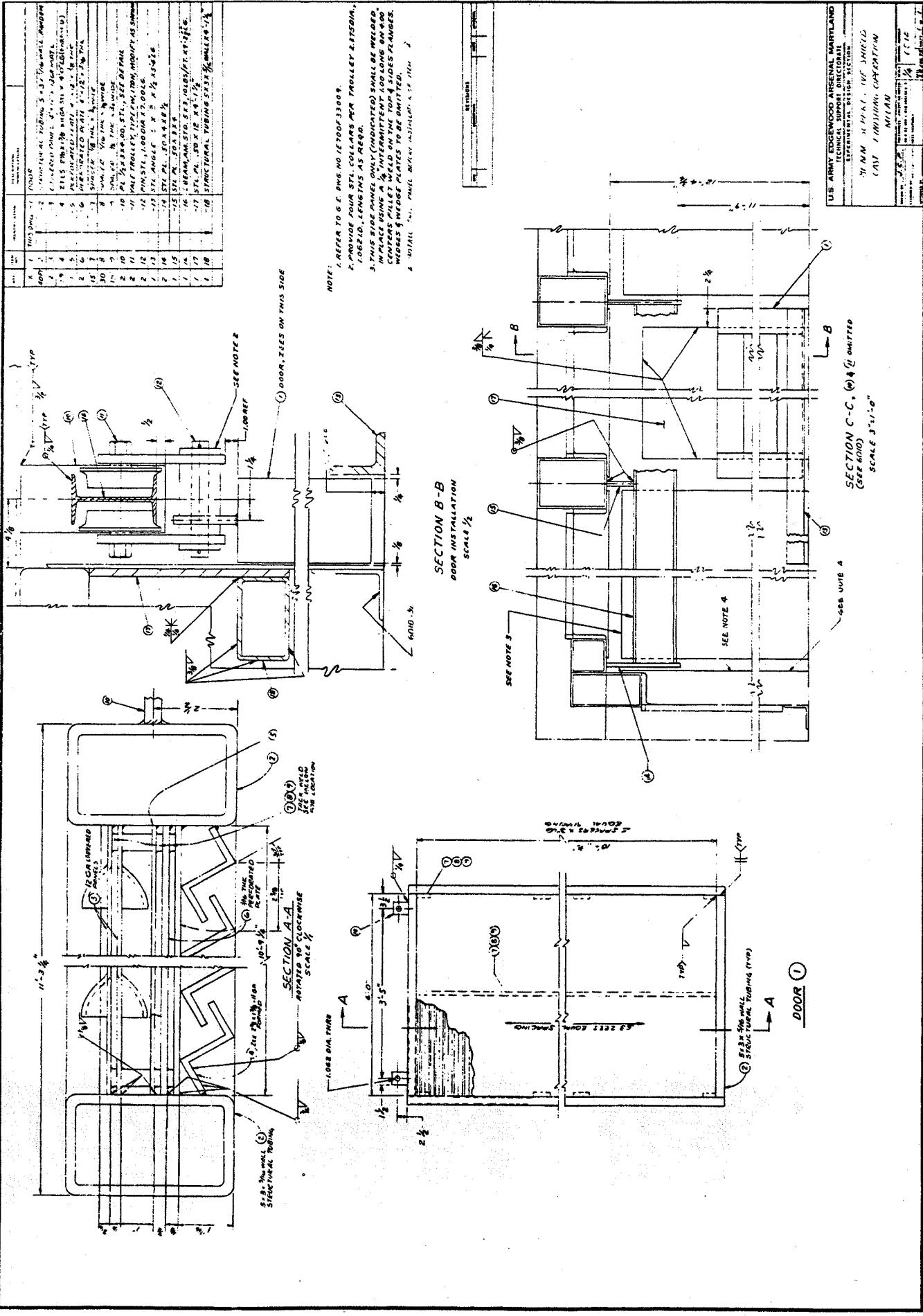
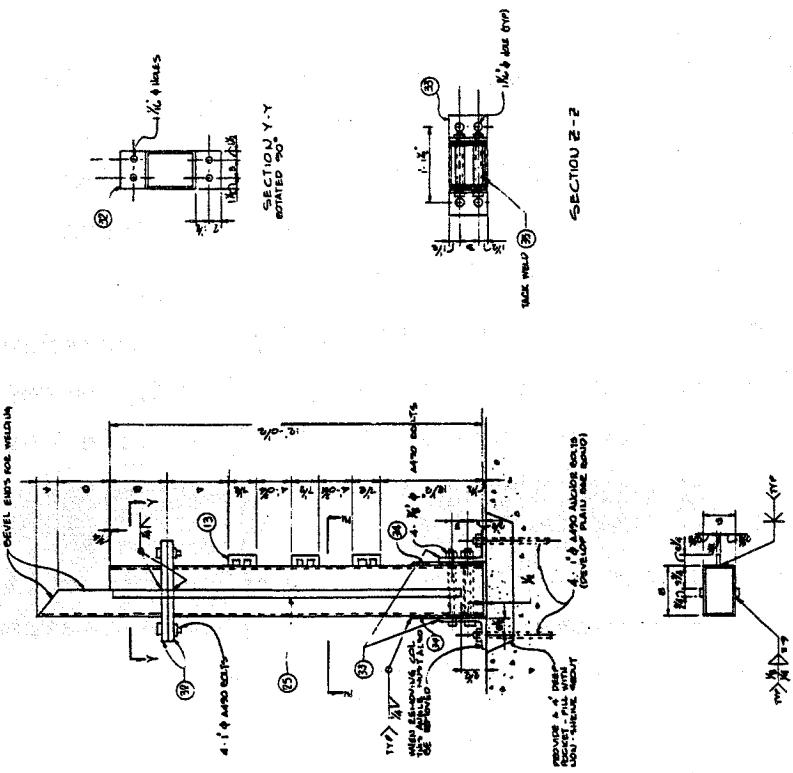


Figure A-20e. Milan 81-mm Suppressive Shield Construction Details (continued)



NOTE: 1. REFER TO S.E. DOW. NO. HE 700 F 3007, SECT. 1 OF 9

U.S. ARMY EDGEWOOD ARSENAL, MARYLAND	SECTION	GO 15
REFINISHING SECTION		
81 MM SUPPRESSIVE SHIELD		
CAST FINISHING OPERATION		
MILAN		

Figure A-20f. Milan 81-mm Suppressive Shield Construction Details (concluded)

Shield design. These modifications are shown in Fig. A-21.

The Milan 81-mm shield utilizes a sliding access door. The door section, which is shown on Fig. A-20e, is the same as the original design.

The Milan 81-mm shield does not utilize the 1/4-inch steel base plate employed with the original design. The columns of the revised design are anchored to either the existing plant foundation or to a prepared foundation as illustrated in Fig. A-22.

It was deemed desirable to be able to provide access to the interior of the shield for equipment too large to pass through the personnel door. Accordingly, a removable column has been designed which will permit opening up an area approximately 8 x 12 feet. This column modification is shown in Fig. A-23.

A.6.2 Application

a. Prototype 81-mm Shield

The Prototype 81-mm Suppressive Shield Design was tested and safety approved for 6.72 pounds of C-4 explosive, (10.1 pounds of C-4 for quasi-static pressure) or equivalent. A typical application of this shield would be for 81-mm mortar drill-and-face and/or cast-finishing operations. The charge must be located so that the maximum reflected pressure on any panel does not exceed 220 psi.

The test results show that external pressures are reduced to 2.3 psi or less at three feet from any exterior wall, that the fireball is contained essentially within the shield, and that all fragments are contained by the shield. The test fragment threat consisted of two tests: (a) simultaneous detonation of two each M374, 81-mm mortar projectiles with simulated process equipment, and (b) simultaneous detonation of six each M374, 81-mm mortar projectiles.

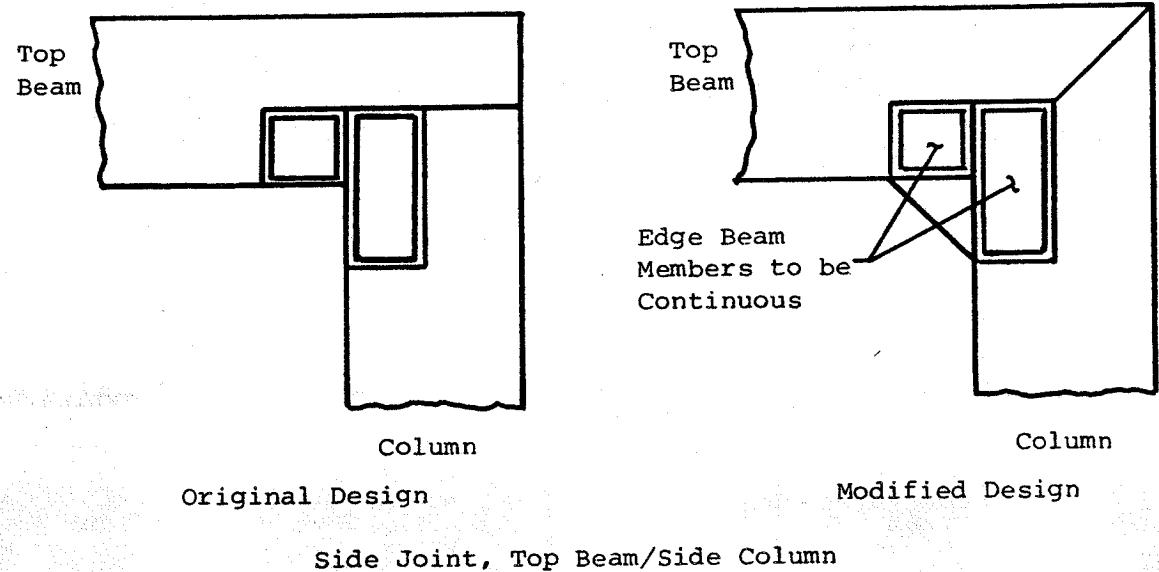
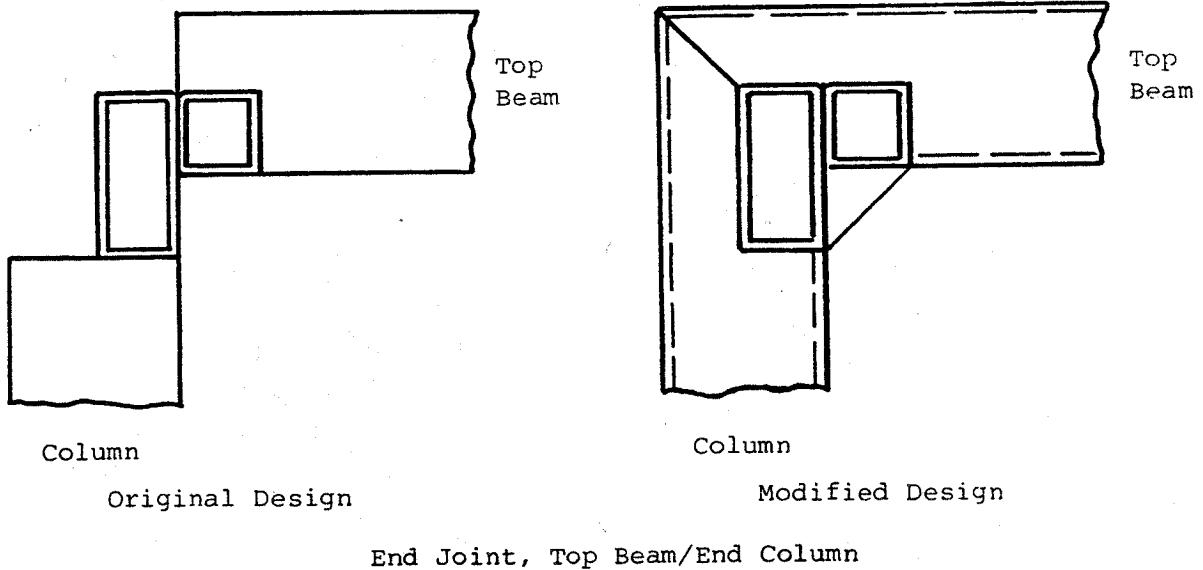


Figure A-21. Revised Structural Frame Corner Design

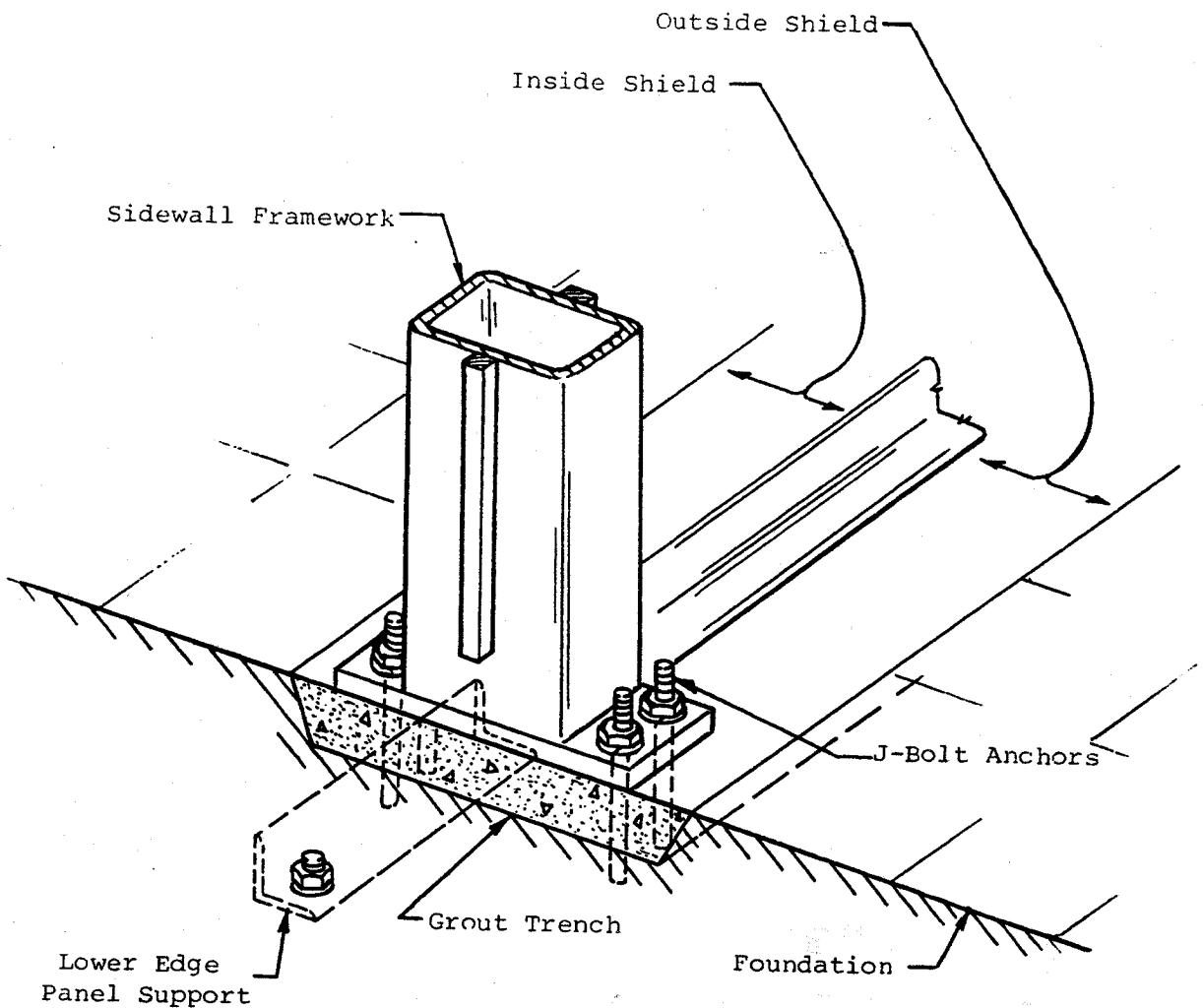


Figure A-22. Milan 81-mm Suppressive Shield Foundation Attachment

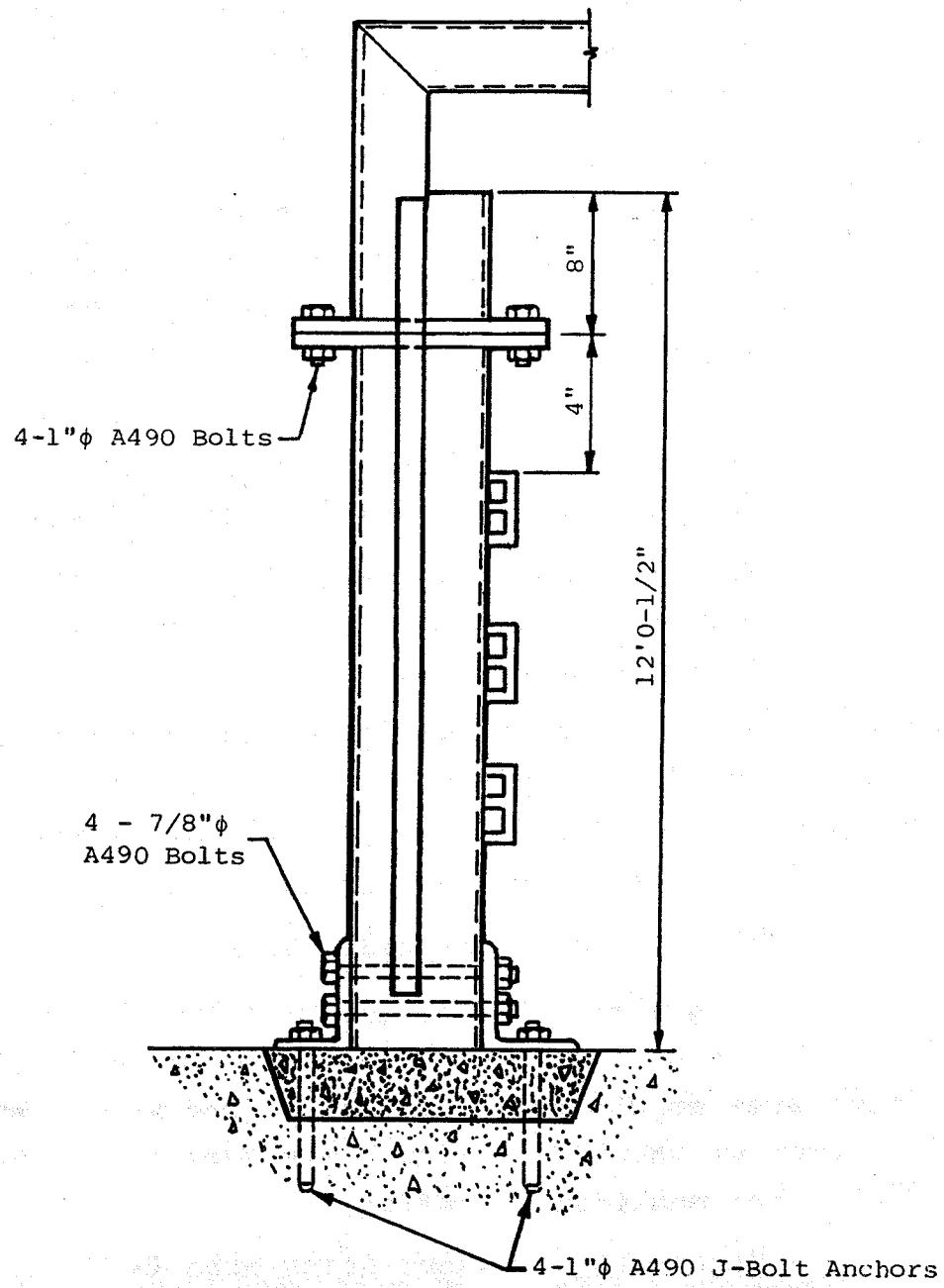


Figure A-23. Milan 81-mm Suppressive Shield Removable Column

The Prototype 81-mm Shield design would be appropriate for munition operations

- Requiring a maximum rectangular floor area 14 feet by 18.7 feet with a maximum 12.4-feet clear height (inside dimensions).
- Involving a charge weight equivalent to 6.72 pounds of C-4 explosive (7.24 lb TNT equiv.; maximum W/V ratio = $0.0034 \text{ lb}/\text{ft}^3$; minimum $Z = 3.62 \text{ ft}/\text{lb}^{1/3}$ to sidewall and minimum $Z = 3.20 \text{ ft}/\text{lb}^{1/3}$ for roof).
- That produce no fragments which cannot be defeated by 1.23 inches of mild steel.
- That are compatible with 2.3 psi peak external pressure at three feet from any exterior shield wall.

Utilization of the prototype 81-mm design for any application may incorporate the design improvements of the Milan 81-mm adaptation, i.e., the revised frame corner design, sliding door, shield anchors, and removable column.

b. Milan 81-mm Suppressive Shield

This adaptation of the Prototype 81-mm Shield design is appropriate for applications which do not require as much floor area as the prototype design and which involve a smaller charge weight. The Milan 81-mm Suppressive Shield is appropriate for munition operations

- Requiring a maximum floor area 14 feet square with a 12.4-foot maximum clear height (inside dimensions).

- Involving a charge weight equivalent to 4.2 pounds (6.3 pounds of C-4 for quasi-static pressure) of bare C-4 explosive (4.53 lb TNT equiv.; maximum W/V ratio = $0.0028 \text{ lb}/\text{ft}^3$; minimum $Z = 4.23 \text{ ft}/\text{lb}^{1/3}$ at sidewalls and minimum $Z = 3.75 \text{ ft}/\text{lb}^{1/3}$ for roof).
- That produce no fragments which cannot be defeated by 1.23 inches of mild steel.
- That are compatible with 2.3 psi peak external pressure at 7.3 feet from any exterior shield wall.

A.6.3 Modification

The Milan 81-mm shield design is an example of modification of a safety approved shield design for which safety approval may be obtained without further testing. The Milan 81-mm design did not alter the fundamental hazard-defeating components of the shield that had been proof-tested, i.e., the panels and the structural frame, except to make the frame stronger. The panels resist airblast loads primarily by one-way flexural response of the Z shapes in the 4-foot direction. These loads are then transmitted to the vertical and/or horizontal frame members. Therefore, since the panel and frame cross sectional properties remain the same and since the 4-foot modular spacing and frame member spans are unchanged, the airblast load carrying capacity of the design has not been diminished. The fragment defeating capability of the design is the same, since the same thickness of steel has been maintained.

Assurance that the proof-test airblast loading will not be exceeded is provided by the increased Z value and the decreased W/V ratio. The structural frame corner design revision clearly provides increased load-carrying capability and does not require further testing. Similarly, it can be shown with proven and accepted analytical methods that the shield anchoring system

and the removable column design are as strong as, or stronger than, the corresponding elements of the tested design. Changing the access door method of support from hinged to monorail does not alter the basic door configuration that was successfully proof tested. In addition, the monorail support system utilized was successfully proof tested with the Group 4 shield design.

A.7 REFERENCES

- A-1 Katsanis, D.J., Safety Approval of Suppressive Shields, EM-TR-76088, Edgewood Arsenal, Aberdeen Proving Ground, Md., August 1976. (U)